D-Link®

DSL-502G
ADSL Ethernet/USB Router
User's Guide

(March 2002)

651DSL500055

Wichtige Sicherheitshinweise

1. Bitte lesen Sie sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den spätern Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Vervenden Sie keine Flüssig- oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Um eine Beschädigung des Gerätes zu vermeiden sollten Sie nur Zubehörteile verwenden, die vom Hersteller zugelassen sind.
5. Das Gerät is vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sichern Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen. Verwenden Sie nur sichere Standorte und beachten Sie die Aufstellhinweise des Herstellers.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, daß diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim Anschluß an das Stromnetz die Anschlußwerte.
9. Die Netzanschlußsteckdose muß aus Gründen der elektrischen Sicherheit einen Schutzleiterkontakt haben.
10. Verlegen Sie die Netzanschlußleitung so, daß niemand darüber fallen kann. Es sollete auch nichts auf der Leitung abgestellt werden.
11. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
12. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
13. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. Elektrischen Schlag auslösen.
14. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
15. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:

a – Netzkabel oder Netzstecker sint beschädigt.

b – Flüssigkeit ist in das Gerät eingedrungen.

c – Das Gerät war Feuchtigkeit ausgesetzt.

d – Wenn das Gerät nicht der Bedienungsanleitung ensprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.

e – Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.

f – Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.

16. Bei Reparaturen dürfen nur Orginalersatzteile bzw. den Orginalteilen entsprechende Teile verwendet werden. Der Einsatz von ungeeigneten Ersatzteilen kann eine weitere Beschädigung hervorrufen.
17. Wenden Sie sich mit allen Fragen die Service und Repartur betreffen an Ihren Servicepartner. Somit stellen Sie die Betriebssicherheit des Gerätes sicher.
18. Zum Netzanschluß dieses Gerätes ist eine geprüfte Leitung zu verwenden, Für einen Nennstrom bis 6A und einem Gerätegewicht großer 3kg ist eine Leitung nicht leichter als H05VV-F, 3G, 0.75mm2 einzusetzen

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

CE Mark Warning

This is a Class B product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

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About This User's Guide

This user's guide provides instructions on how to install the DSL-502G ADSL Router and use it to connect a computer or Ethernet LAN to the Internet.

If you are using a computer with a functioning Ethernet port, you can use the Quick Installation Guide to quickly establish your ADSL connection and access the Internet.

Terminology

This document uses the terms "Router" (first letter upper case) to refer specifically to the DSL-502G ADSL Router, and "router" (first letter lower case) to refer to all such devices including the DSL-502G. ADSL service is provided by different types of businesses including telephone service providers, Internet service providers and other businesses that provide computer network and telecommunications services. The term "service provider" is used in this guide to refer to any service that sells or leases DSL services and equipment.

Overview of the User's Guide

Chapter 1 Introduction to Router – Describes the Router and its key features. Provides an introduction to ADSL. Lists standards to which the Router complies. Contains a packing list.

Chapter 2 Prepare for Installation – Lists everything needed for the installation of the Router, including specific information needed for configuration. Provides space for recording all the necessary information.

Chapter 3 Hardware Installation – Discusses how to connect the Router to an Ethernet LAN.

Chapter 4 First Time Set Up – Provides information on how to configure the Router and establish the ADSL connection using the web-based manager.

Chapter 5 Web-based Management – Describes how to use the web-based manager and discusses the management options available.

Appendix A Technical Specifications – Lists the technical specifications of the Router, including standards compliance.

Appendix B LAN Setup – Discusses different options for IP addressing on your LAN.

Appendix C IP Concepts – A discussion of IP address assignment and subnets for a private network.

Appendix D DSL-502G Firmware Upgrade Utility – Describes how to install and use the firmware upgrade utility used with the Router.

Appendix E Microfilters and Splitters – Contains illustrated examples of how to use low pass filters.

Before You Start

Please read and make sure you understand all the prerequisites for proper installation of your new Router. Have all the necessary information and equipment on hand before beginning the installation.

Low Pass Filters

ADSL and telephone services share the same copper wire to carry their respective signals, a filtering mechanism may be necessary to avoid mutual interference. It may be necessary to install a low pass filter device (also called micro-filter or splitter) for each telephone that shares the line with the ADSL line. Micro-filters are easy to install passive devices that connect to the ADSL device and/or telephone using standard telephone cable. Ask your service provider for more information about the use of low pass filters with your installation. Appendix E provides illustrated examples of how to install two common types of filters.

Requirements for Installation

You will need a computer to set up and use the Router. In addition, it will be necessary to configure the device using information provided by your ADSL service provider. This information is used to establish the parameters of the ADSL connection and identify the Router on the WAN.

Configuration Computer Requirements

The Router can be configured using a computer that meets the conditions discussed here.

Operating System

The DSL-502G uses an HTML-based web interface for managing and monitoring the system. This web manager may be accessed using any operating system capable of running web browser software. The firmware upgrade utility however must be installed and used on a computer running a Microsoft® Windows operating system.

Web Browser

Any common web browser such as Microsoft Internet Explorer or Netscape Navigator can be used to configure the Router using the embedded web-based management software.

Ethernet Adapter (NIC)

All PCs using the Router for Internet access, including the Manager PC, must have an Ethernet NIC (Network Interface Card) installed. Each computer on the internal network must have TCP/IP Protocol enabled. If you have an existing Ethernet set up, the PCs should already meet this requirement.

If you are using the Router in the role of a simple bridge (RFC 1483), additional software may be needed for the computer or server connected to the Router (on the LAN side). You may be instructed by your service provider to configure the NIC card for DHCP or PPP connection. Your network service provider will give you more information.

Connection Method

It is necessary to know the connection method used for the ADSL connection. The connection method is also known as the ADSL Protocol, Encapsulation Protocol or Encapsulation Method. These protocols are defined by "RFCs" which are internationally recognized standards for networking protocols. You will be required to configure the Router to use the correct method. PPP connections require account information to be entered and stored in the device. Bridged Ethernet connections require that the IP settings be set manually.

The Router supports three connection methods:

- PPP over ATM (RFC 2364) used by default
- PPP over Ethernet (RFC2516)
- IP over ATM (RFC 1577)
- Ethernet over ATM (RFC 1483)

PPP Connections (RFC 2516 & RFC 2364)

For PPPoA or PPPoE connections, a verification process is required before the network connection can be established. Use this section to record the information used for authentication.

Account Information (User Name and Password)

For PPP connections, a User Name and Password for the user account are needed to connect to the service provider's network.

ACCOUNT INFORMATION (PPP Connections Only)
User Name:
Password:

Bridged Ethernet Connections (RFC 1483)

Using this method, the DSL-502G acts as a transparent bridge, and is invisible to other devices on both the WAN and LAN side of the bridge. It is therefore necessary to provide some means of acquiring global IP settings for your account.

All connections to the Internet require a unique global IP address. For bridged connections, the global IP settings must reside in a TCP/IP enabled device on the LAN side of the bridge, such as a PC, server or firewall hardware. The IP address can be assigned in a number of ways. Your network service provider will give you instructions about any additional connection software or NIC configuration that may be required.

IPoA Connections (RFC 1577)

IP over ATM connections may require global IP setting for the device. Your service provider will give you IP settings information if needed. Some IPoA connections function like peer-to peer connections and therefore do not require IP setting on the WAN interface.

PVC Settings

Some subscribers may be instructed to change the VPI and VCI values for the device. These numbers define a unique route used on the ATM backbone of the WAN. If your service provider asks you to configure these values for your network connection, follow the instructions in the *Connection Profile* section of Chapter 5.

Introduction

This section provides a brief description of the Router, its associated technologies and a list of Router features.

What is ADSL?

Asymmetric Digital Subscriber Line (ADSL) is an access technology that utilizes ordinary copper telephone lines to enable broadband high-speed digital data transmission and interactive multimedia applications for business and residential customers. For ADSL services, it is not necessary expensive new cabling or condition the line in any way.

ADSL greatly increases the signal carrying capacity of copper telephone lines without interfering with regular telephone services. For the ADSL user, this means faster downloads and more reliable connectivity. ADSL devices make it possible to enjoy benefits such as high-speed Internet access without experiencing any loss of quality or disruption of voice/fax telephone capabilities.

ADSL provides a dedicated service over a single telephone line operating at speeds of up to 8 Mbps downstream and up to 640 Kbps upstream, depending on local telephone line conditions. A secure point-to-point connection is established between the user and the central office of the service provider.

D-Link ADSL devices incorporate the recommendations of the ADSL Forum regarding framing, data format, and upper layer protocols.

Router Description and Operation

The DSL-502G ADSL Router is designed to provide a simple, cost-effective and secure ADSL Internet connection for your small- to medium-sized private network. The DSL-502G combines the benefits of high-speed ADSL connection technology and TCP/IP routing with a conventional Ethernet interface in one compact and convenient package. ADSL connection technology enables many interactive multi-media applications such as video conferencing and collaborative computing.

The Router is easy to install and use. The DSL-502G connects to an Ethernet LAN via a standard Ethernet 10BASE-T interface using RJ-45 connectors. The ADSL connection is made using ordinary twisted-pair telephone line with standard RJ-11 connectors. This arrangement means that several PCs can be networked and connected to the Internet using a single WAN interface and IP address. An additional computer can be connected to the Router via the USB port.

The Router supports transparent bridging and can be used for IP packet routing over the Internet. Cost saving features of the Router such as NAT (Network Address Translator) and DHCP (Dynamic Host Configuration Protocol) improve administration efficiency and improve security. The advanced security enhancements, packet filtering and port redirection, can help protect your network from potentially devastating intrusions by malicious agents from outside your network.

Router Features

The DSL-502G ADSL Ethernet Router utilizes the latest ADSL enhancements to provide a reliable Internet portal suitable for most small to medium sized offices. DSL-502G advantages include:

- **PPP (Point-to-Point Protocol) Security** The DSL-502G ADSL Router supports PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol) for PPP connections.
- **DHCP Support** DHCP (Dynamic Host Configuration Protocol) automatically and dynamically assigns al LAN IP settings to each host on your network. This eliminates the need to reconfigure every host whenever changes in network topology occur.
- **Network Address Translation (NAT)** For small office environments, the DSL-502G allows multiple users on the LAN to access the Internet concurrently through a single Internet account. This provides Internet access to everyone in the office for the price of a single user.

  NAT improves network security in effect by hiding the private network behind one global and visible IP address. NAT address mapping can also be used to link two IP domains via a LAN-to-LAN connection.
- **TCP/IP (Transfer Control Protocol/Internet Protocol)** The DSL-502G supports TCP/IP protocol, the language used for the Internet. It is compatible with access servers manufactured by major vendors.
- **RIP-1/RIP-2** The DSL-502G supports both RIP-1 and RIP-2 exchanges with other routers. Using both versions lets the Router to communicate with all RIP enabled devices.
- **Static Routing** This allows you to select a data path to a particular network destination that will remain in the routing table and never "age out". If you wish to define a specific route that will always be used for data traffic from your LAN to a specific destination within your LAN (for example to another router or a server) or outside your network (to a ISP defined default gateway for instance).
- **Default Routing** This allows you to choose a default path for incoming data packets for which the destination address is unknown. This is particularly useful when if the Router functions as the sole connection to the Internet.
- **ATM (Asynchronous Transfer Mode)** The DSL-502G supports *Bridged Ethernet over ATM* (RFC1483), *IP over ATM* (RFC1577) and *PPP over ATM* (RFC 2364).
- **Precise ATM Traffic Shaping** Traffic shaping is a method of controlling the flow rate of ATM data cells. This function helps to establish the Quality of Service for ATM data transfer.
- **G.hs (Auto-handshake)** This allows the Router to automatically choose either the G.lite or G.dmt ADSL connection standards.
- **High Performance** Very high rates of data transfer are possible with the Router. Up to 8 Mbps downstream bit rate using the G.dmt.
- **Full Network Management** The DSL-502G incorporates SNMP (Simple Network Management Protocol) support for web-based management and text-based network management via an RS-232 or **Telnet** connection.
- **Telnet Connection** The Telnet enables a network manager to access the Router's management software remotely.
- **Easy Installation** The DSL-502G uses a web-based graphical user interface program for convenient management access and easy set up. Any common web browser software can be used to manage the Router.

Front Panel

Place the Modem in a location that allows a view of the LED indicators. To save space you can use the feet to stand the device on either its right or left side.

Figure 1. Front Panel

Rear Panel

All cable connections to the Modem are made at the rear panel. The factory reset button is located here as well.

Figure 2. Rear Panel

Cable Connections

All cable connections to the Router are made at the rear panel. The factory reset button is located here as well.

Ethernet port, connect Ethernet cable here
USB Port
Connect Power Adapter here
ADSL port, connect ADSL cable here
Reset button
RJ-14 console port used for configuration (requires RJ-14 to RS-232 adapter)

Figure 3. Cable Connections to Router

LED Indicators

Figure 3 LED Indicators

The LED Indicators read as follows:

Power Steady green light indicates the unit is powered on.

Status Lights steady green during the ADSL negotiation phase & connection stage.

ADSL: Link Steady green light indicates a valid ADSL connection. This will light after the ADSL negotiation process has been settled.

ADSL: Act Blinking green light indicates an active WAN session.

Ethernet: Link Steady green light indicates a valid Ethernet connection.

Ethernet: Act Blinking green indicates an active Ethernet session.

USB: Link Steady green light indicates a valid USB connection.

USB: Act Blinking green indicates an active USB session.

Packing List

Open the shipping carton and carefully remove all items. In addition to this User's Guide, ascertain that you have:

1. One DSL-502G ADSL Ethernet/USB Router
2. One DSL-502G tool kit on CD-ROM containing The User's Guide & USB Drivers
3. One twisted-pair telephone cable used for ADSL connection
4. One straight-through Ethernet cable
5. One AC power adapter suitable for your electric service
6. One USB Cable
7. Two feet used to stand Router on end

Hardware Installation

In this chapter you will learn about the various connections you will need to make in order to use the Router.

When selecting the location for the Router be sure to allow room to access the connections on the rear panel. You will want to place the Router so that you will be able to see the LED indicators on the front panel. Allow some space above the Router for ventilation to avoid problems with overheating.

It may be convenient for you locate the Router near the PC you intend to use for initial configuration of the Router. For initial configuration of the device you may need convenient access to the RS-232 serial port on the rear panel. The RS-232 serial port is intended for use with text-based console management software for the initial configuration and for out-of-band management of the Router. Whether it is necessary to use an RS-232 console manager for first time set up depends on how you allocate IP addresses on your network. Read Chapter 4, *First Time Set Up* to help you decide how best to use the Router on your network.

Connect ADSL Line

Use the twisted-pair ADSL cable (standard telephone cable) included with the Router to connect it to your telephone line. Simply plug one end of the cable into the ADSL port (RJ-11 receptacle) on the rear panel of the Router and insert the other end into the wall jack. The ADSL connection is the WAN interface. It links the Router to the network service provider's backbone infrastructure. This is the Router's access point to the Internet.

The Router must undergo a negotiation process to establish the terms of the ADSL connection. During this negotiation the Status LED will light a steady green, after which it will blink. If the ADSL line is disconnected, it will repeat this process.

Computer to Router Connection

There are two options available to connect the Router directly to a computer. You can connect the Router directly to a 10/100BASE-TX Ethernet adapter card (NIC) installed on a PC using the included Ethernet cable. Or, you can use the USB port to connect a single system to the Router with the USB cable included with your Router.

Connect Ethernet LAN to Router

The Router may be connected to any 10/100BASE-TX Ethernet LAN. Any connection to an Ethernet concentrating device such as a switch or hub must operate at a speed of 10/100 Mbps only. When connecting the Router to any Ethernet device that is capable of operating at speeds higher than 10Mbps, be sure that the device has auto-negotiation (NWay) enabled for the connecting port.

Use standard twisted-pair cable with RJ-45 connectors. The RJ-45 port on the Router is a crossed port (MDI-X). Follow standard Ethernet guidelines when deciding what type of cable to use to make this connection. When connecting the Router directly to a PC or server use a normal straight-through cable. You should use a crossed cable when connecting the Router to a normal (MDI-X) port on a switch or hub. Use a normal straight-through cable when connecting it to an uplink (MDI-II) port on a hub or switch. A valid connection will be indicated by the Ethernet Link LED indicator.

The rules governing Ethernet cable lengths apply to the LAN to Router connection. Be sure that the cable connecting the LAN to the Router does not exceed 100 meters.

Hub or Switch to Router Connection

Connect the Router to an uplink port (MDI-II) on an Ethernet hub or switch with a straight-through cable. If you wish to reserve the uplink port on the switch or hub for another device, connect to any on the other MDI-X ports (1x, 2x, etc.) with a crossed cable.

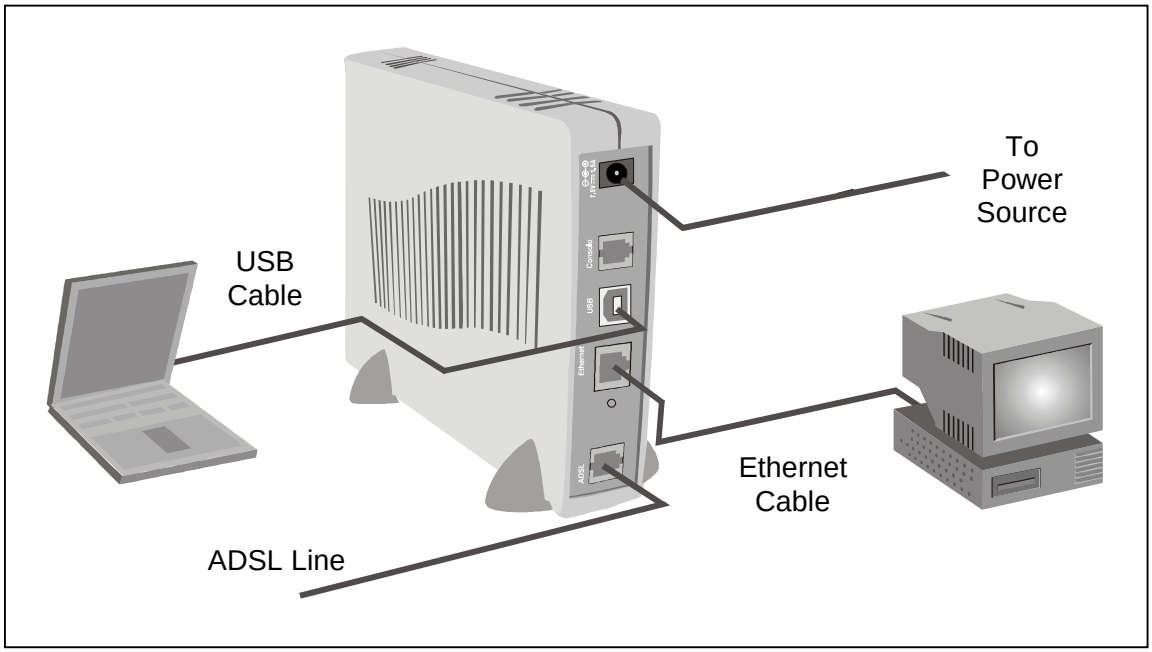


Figure 4. Router with USB and Ethernet to PC Connection

USB Connections

The DSL-502G can connect to one computer through the USB interface. This connection provides access to the Internet through the ADSL connections as well as to other computers on the LAN through the Ethernet port. In order to use the USB port two drivers must be installed on any system that will be using it. See the next chapter for instructions on how to install the USB drivers.

Power On Router

To power on the device:

1. Insert the AC Power Adapter cord into the power receptacle located on the right side panel of the Router and plug the adapter into a nearby power source.
2. You should see the Power LED indicator light up and remain lit.

4

First Time Set Up

This chapter discusses the steps to first establish the WAN connection. The remaining features not directly concerned with establishing the initial connection are explained in Chapter 5, *Web-based Management*.

It is recommended that you install and configure the Router using one non-networked computer. This allows you to verify that the ADSL service is functioning and that you are able to communicate with the device. Once the initial ADSL connection is established, you can proceed to build an Ethernet LAN around the device or incorporate it into an existing LAN.

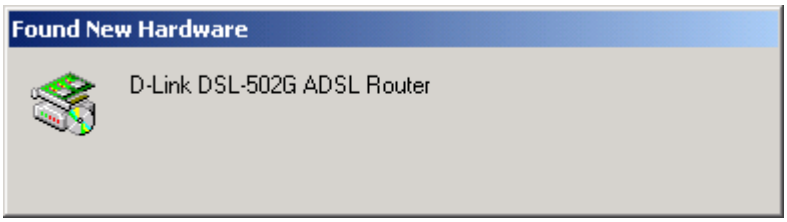
For most users, it will probably be most convenient to access the web configuration software using the Ethernet connection. Any computer equipped with an Ethernet port may use the Router's Ethernet interface. However, if you prefer to configure the Router through the USB port it is necessary to first install two drivers on your system. These drivers are designed specifically for the DSL-502G and enable your computer to send and receive data through the Router's USB interface and communicate with computers on the Ethernet LAN. Only one computer at a time can use the USB port. Follow the procedure below to install the USB driver. Once the driver has been installed you can use your web browser to access the configuration software.

USB Driver Installation

The USB connection requires you to install two (2) software drivers on your Microsoft Windows 98/2000/Me/XP computer in order to activate the USB connection. Computers with other operating systems including Windows 95, Mac OS, Linux, etc. can use the Ethernet port but not the USB port.

Follow these steps to install the USB driver:

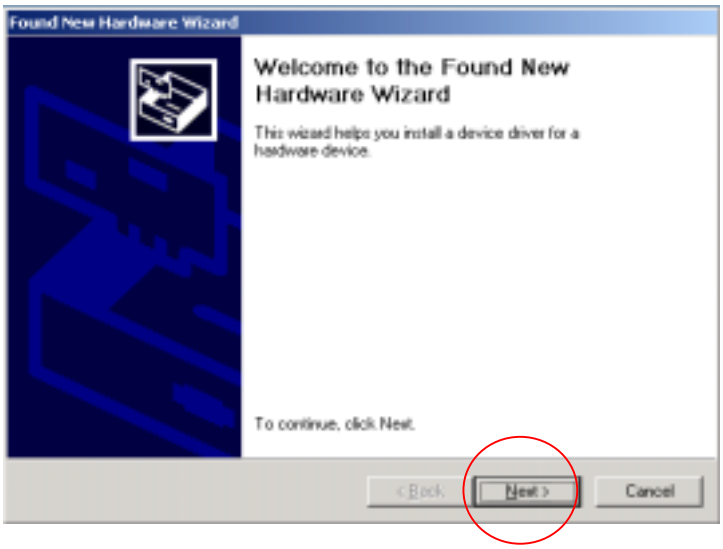
1. After you have plugged the USB cable from your computer into the USB port of the DSL-502G, the following screen will appear:



2. Next, the **"Found New Hardware Wizard"** dialog box is displayed.

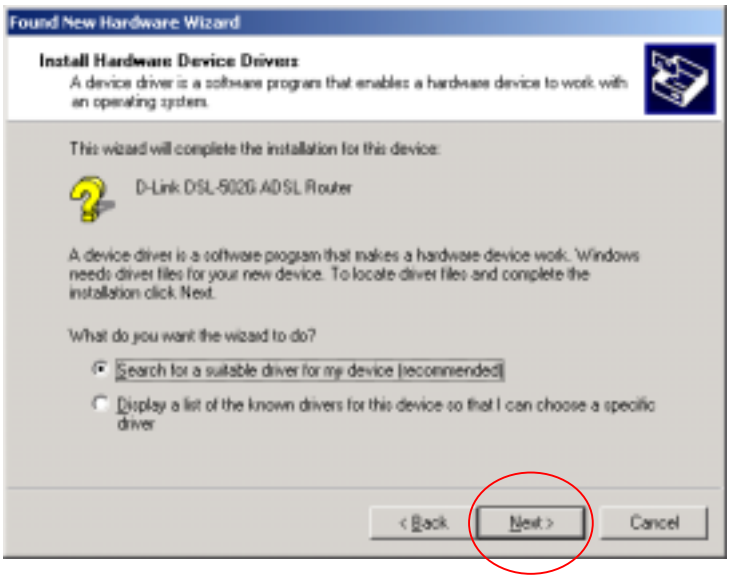
3. Insert the CD that came with the DSL-502G into the CD-ROM drive.

4. Click "Next"

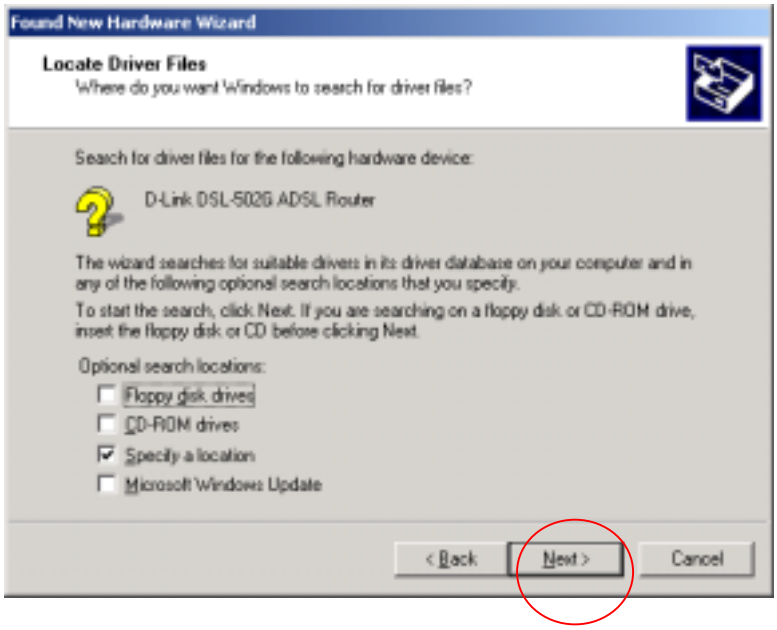

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

Note: The various versions of Windows have different Hardware Installation Wizards, which may cause the windows on your computer to appear a bit different than those shown in this Guide. Further, the Wizard may function differently in that it may automatically locate and load the driver files. Nonetheless, all options listed in this guide should appear in the Wizard windows shown on your computer even though they may be worded differently.

5. Select "**Search for a suitable driver for my device…**"

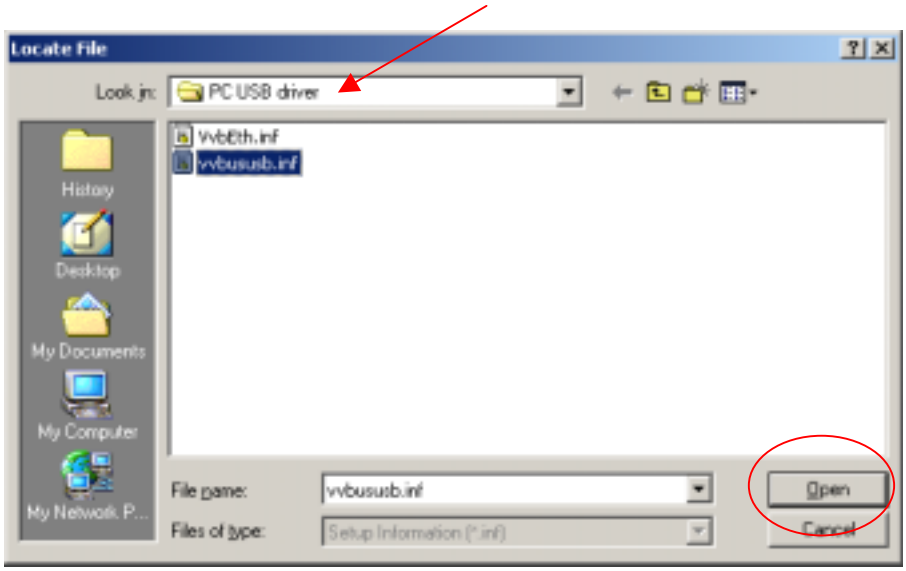

Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
D-Link DSL-502G ADSL Router
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

6. Click "Next"

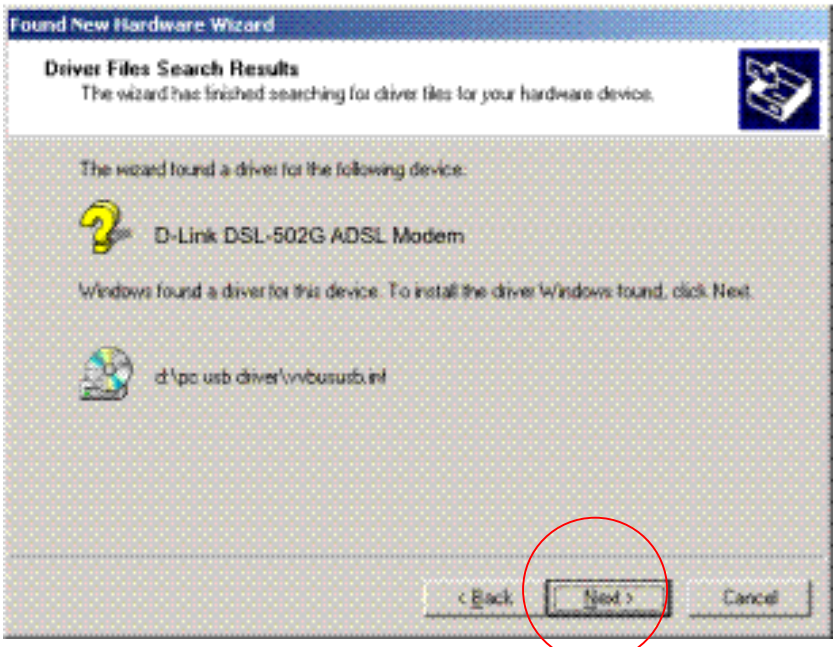

Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
D-Link DSL-502G ADSL Router
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

7. Click "Next"

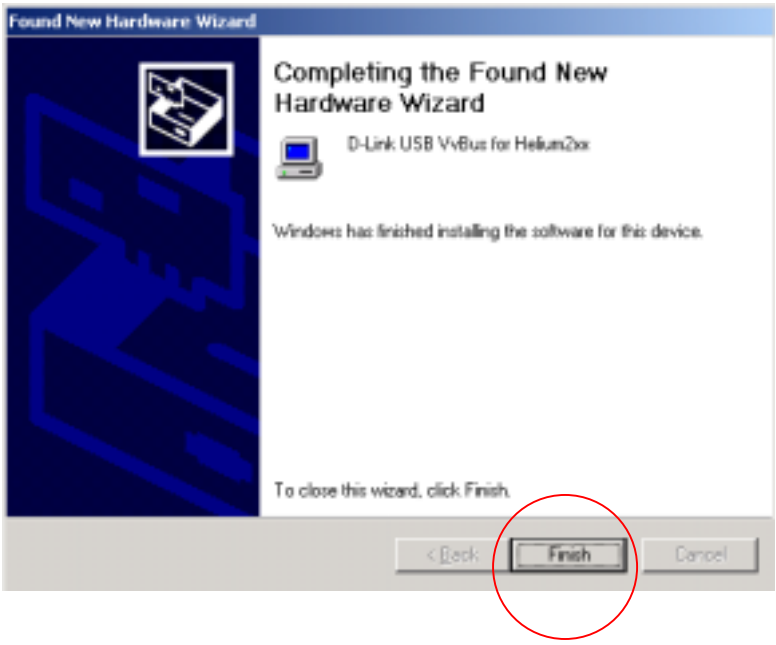
8. Look in the **"PC USB driver"** folder of the CD-ROM drive, as shown below.



9. Highlight "vvbususb.inf."
10. Click "Open"
11. Click "Next" in the window below, to begin installing the first driver.

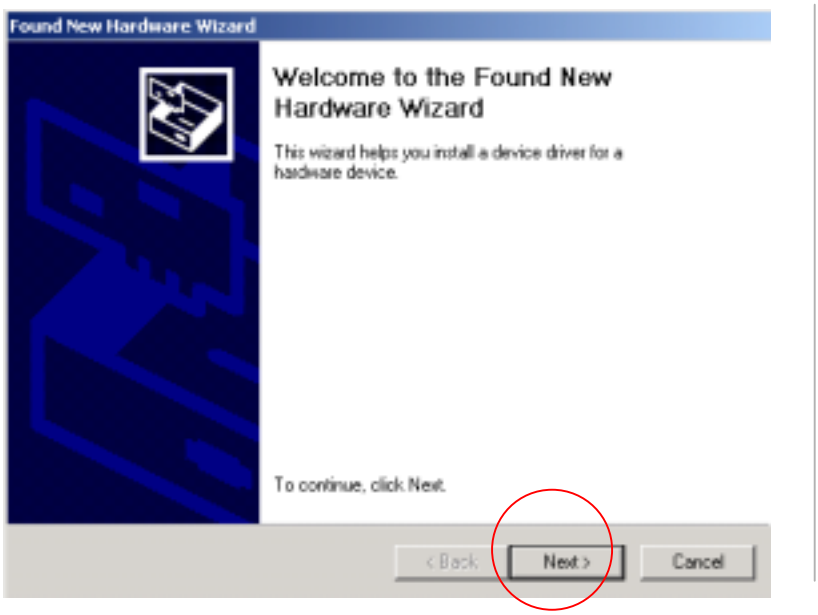

Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
D-Link DSL-502G ADSL Modem
Windows found a driver for this device. To install the driver Windows found, click Next.
d:\pc usb driver\vvbususb.inf
< Back
Next >
Cancel

12. Click **"Finish"** to complete the first part of the USB driver installation.


Found New Hardware Wizard
Completing the Found New Hardware Wizard
D-Link USB VvBus for Helium2xx
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

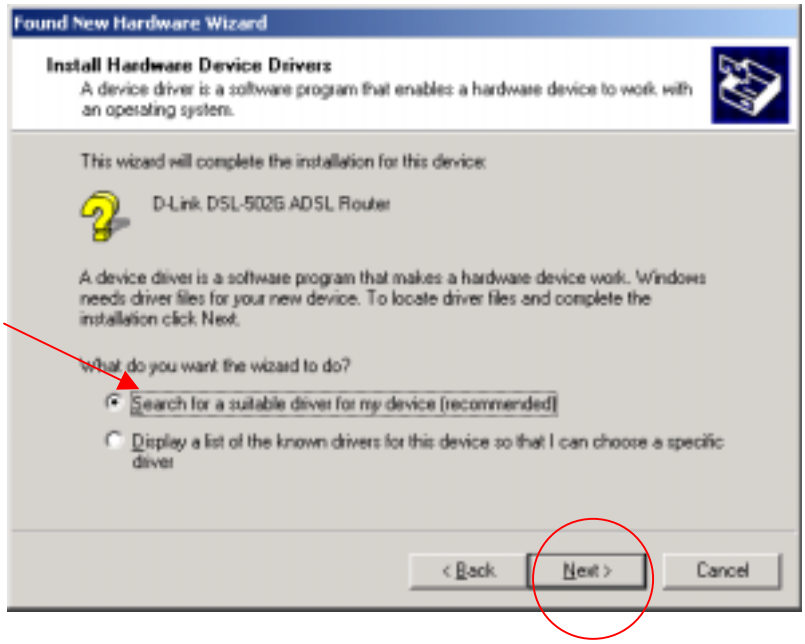
Note: If the "Found New Hardware Wizard" screen (shown below) does not appear automatically after clicking on the "Finish" button in the above window, restart your computer.

13. The **"Found New Hardware Wizard"** screen will be displayed again.


Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

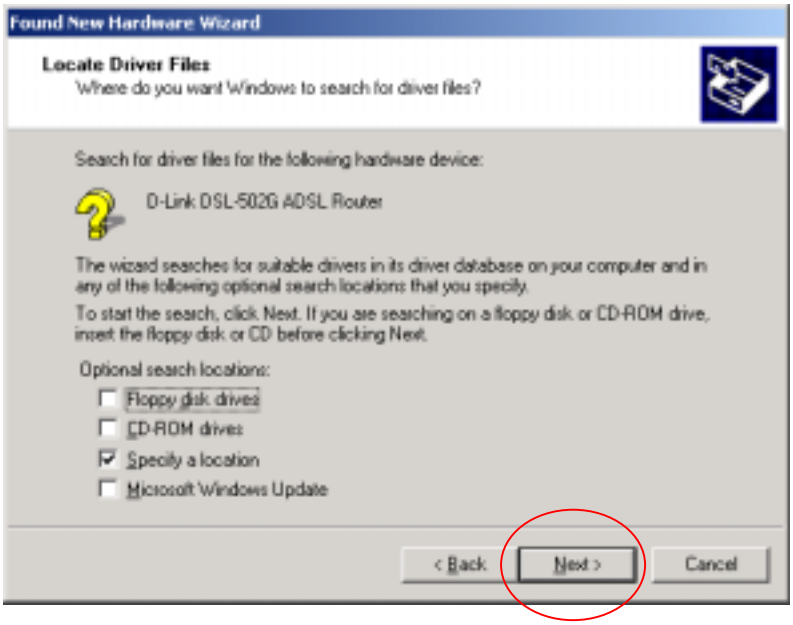
14. Click "Next"

15. Select "Search for a suitable driver for my device…"


Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
D-Link DSL-502G ADSL Router
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

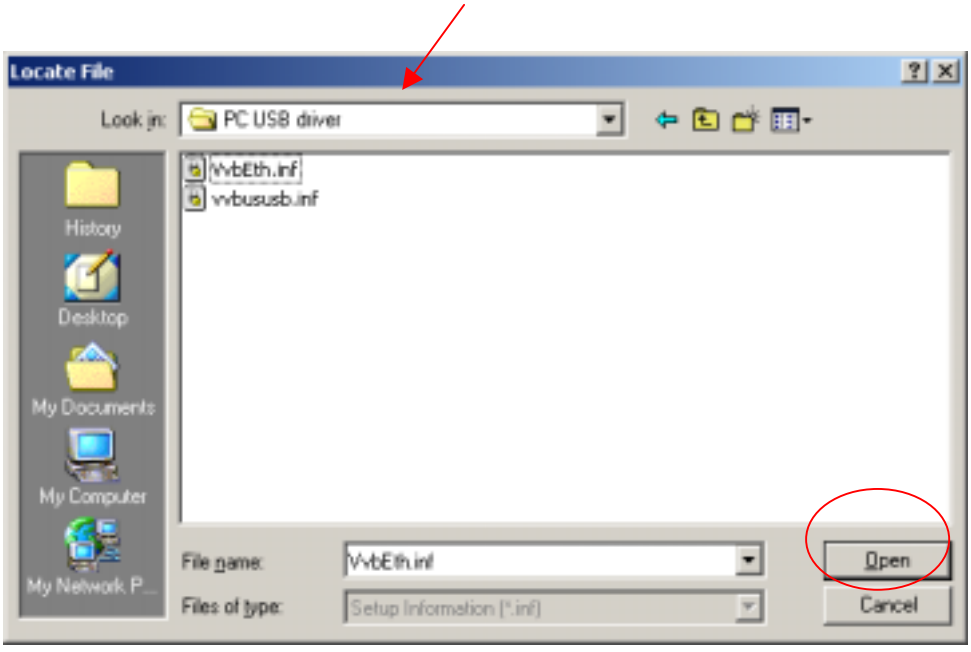
16. Click "Next"

17. Select "Specify a location"


Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
D-Link DSL-502G ADSL Router
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

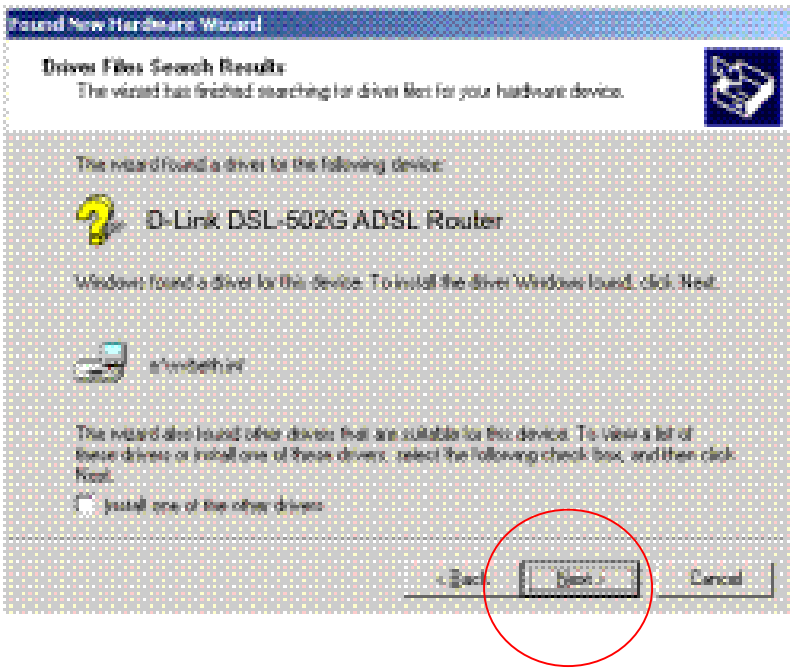
18. Click "Next"

19. Look in the "PC USB driver" folder, as shown below.



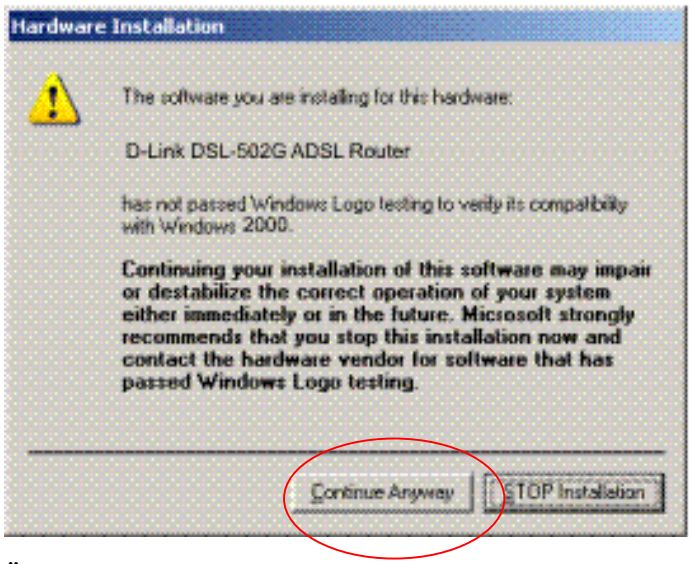
20. Highlight "VvbEth.inf"

21. Click "Open"



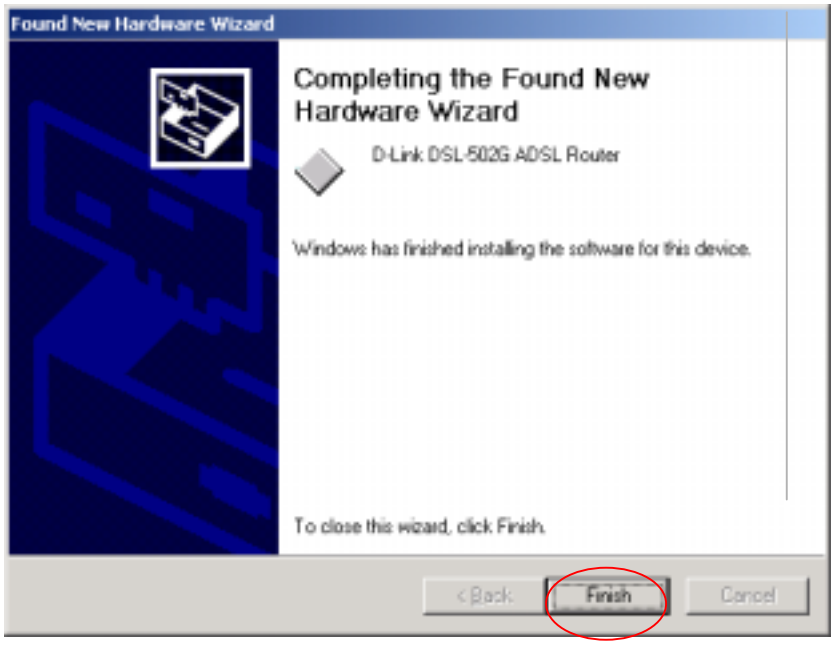
22. Click "Next" to install the second driver.

23. *In Windows 2000, the window at the right may appear. If it does,*

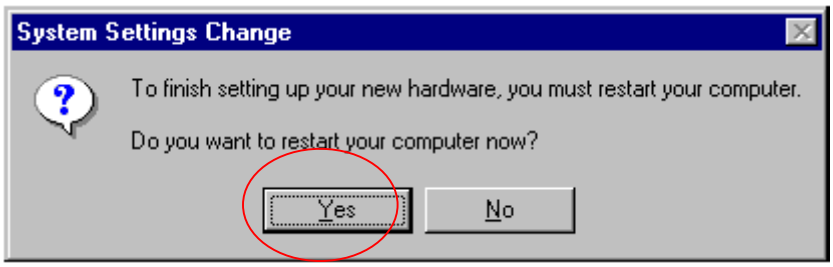

Hardware Installation
The software you are installing for this hardware:
D-Link DSL-502G ADSL Router
has not passed Windows Logo testing to verify its compatibility with Windows 2000.
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

click "Continue Anyway"

For older versions of Windows, you may be asked to insert the Windows CD-ROM that came with your computer. If so, insert the CD and click **"Next"**


Found New Hardware Wizard
Completing the Found New Hardware Wizard
D-Link DSL-502G ADSL Router
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

24. Click **"Finish"** to exit the installation wizard. The driver for the DSL-502G ADSL modem is now installed.


System Settings Change
To finish setting up your new hardware, you must restart your computer.
Do you want to restart your computer now?
Yes
No

25. Finally, you will be asked to restart your computer. Click **"Yes"** to restart the computer.

After the computer restarts, the drivers will be ready for use. Check the USB LED and make sure it is shining solid green.

IP Settings

To further simplify things it is recommended that you use the Router's web-based management software for initial configuration. To communicate with the Router, the manager PC must be connected to it via an Ethernet connection and have a web browser installed. Furthermore, the manager PC must reside within the same subnet as the Router. This can be done easily using the DHCP function of the Router. The Router will act as a DHCP server by default. You can configure the manager PC to obtain its IP settings from the Router by following the procedure in the next section, *Configure the Manager PC for DHCP*.

You should start by configuring the manager PC to obtain IP settings from the Router. Next disconnect the manager PC from the network and connect it directly to the Router with a straight-through Ethernet cable.

Bridged Connections (RFC 1483)

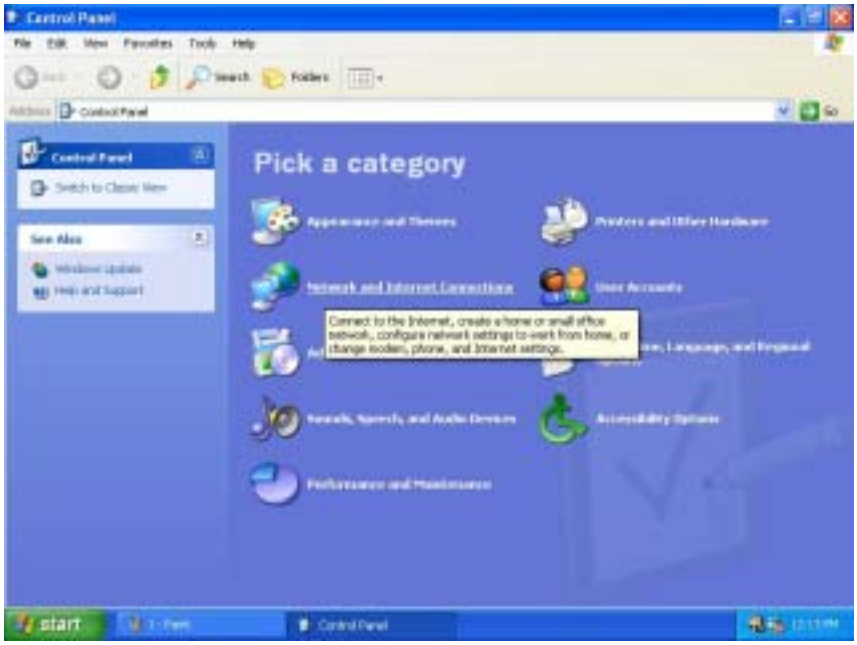
For connections using the DSL-502G as a simple bridge, it may be more convenient to change the LAN IP address of the device. Instructions for changing the device's LAN IP address read Appendix B, *LAN IP Setup*, for more information.

Configure the Manager PC as a DHCP Client (Windows XP)

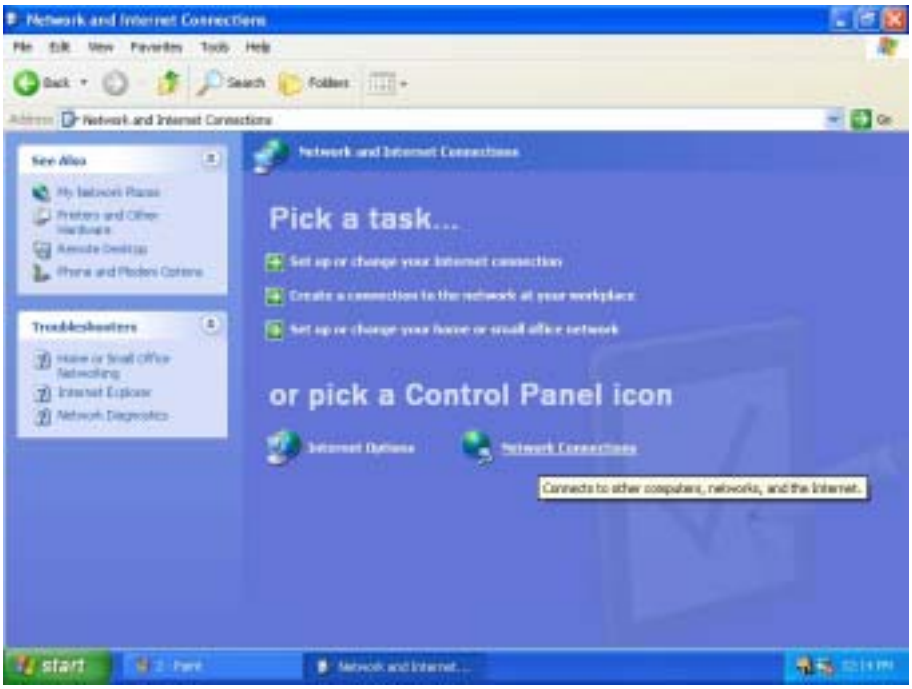
Use the following steps to configure the manager PC to be a DHCP client. These same steps must be performed for every host PC on your network if you use the DHCP function of the Router.

1. From the **Start** menu on your desktop, go to click on **Control Panel**.

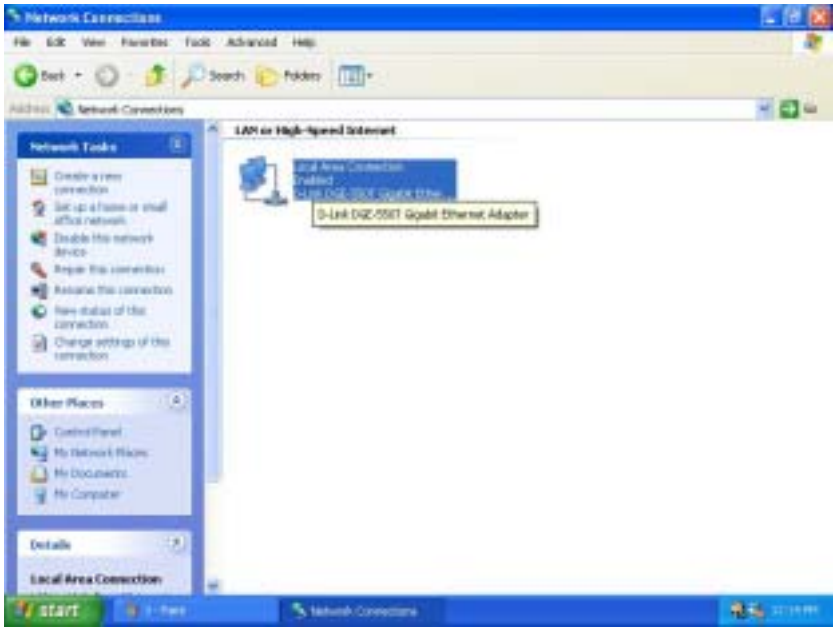
2. In the Control Panel folder, click on **Network and Internet Connections**.



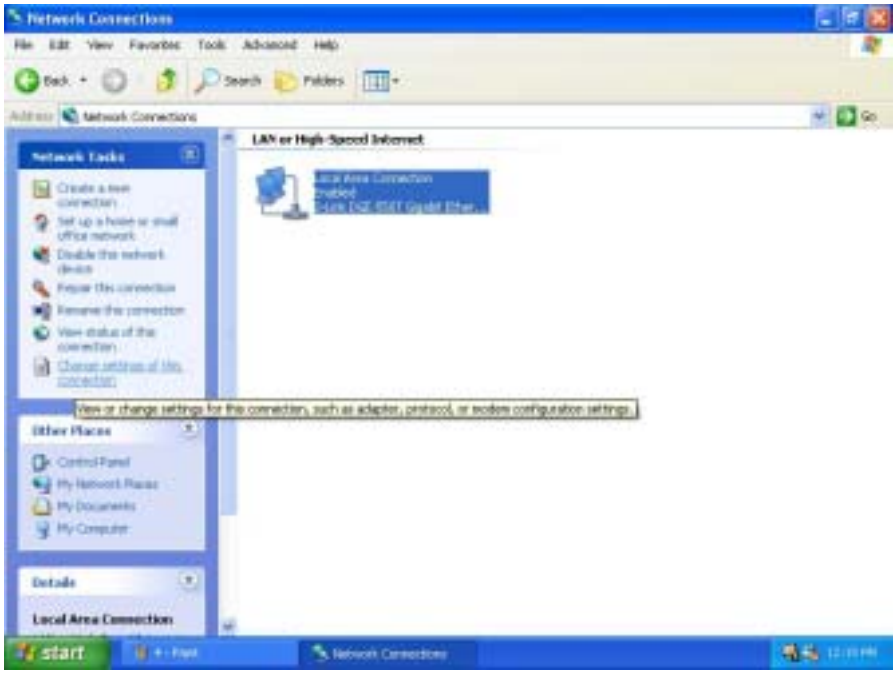
3. In the Network and Internet Connections folder, click on **Network Connections**.



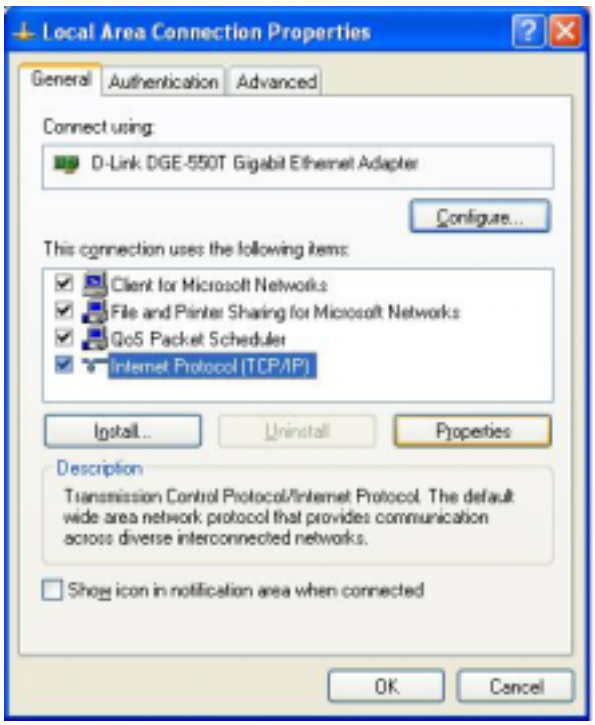
4. In the Network Connections folder, highlight the **Local Area Connection** icon by clicking on it once. A new option is revealed under Network Tabs in the left side panel.



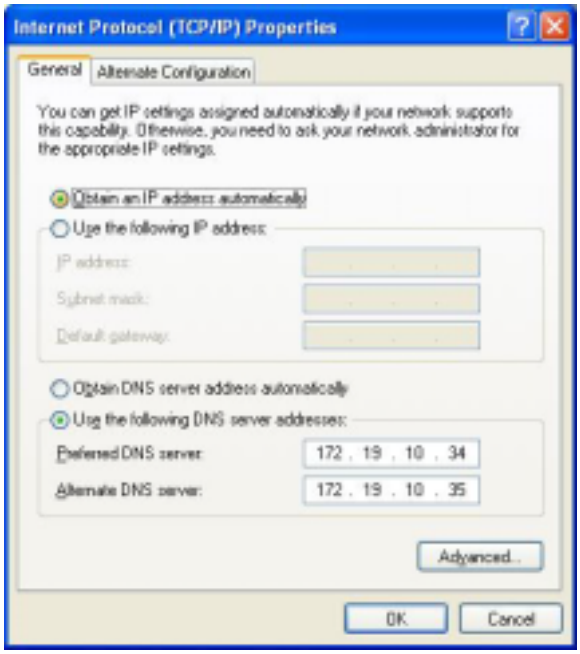
5. Click on **Change settings of the connection** under Network Tabs.



6. In the ***General*** Tab of the **Local Area Connection Properties** menu, highlight **Internet Protocol (TCP/IP)** under "This connection uses the following items:" by clicking on it once. Click on the **Properties** button.



7. Select "Obtain an IP address automatically" by clicking once in the circle. Click the **OK** button.


Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
172 . 19 . 10 . 34
Alternate DNS server:
172 . 19 . 10 . 35
Advanced...
OK
Cancel

Your computer is now ready to use the Router's DHCP function.

Access the Web-based Manager

The Manager PC can now use a web browser to communicate with the Router.

> **Note:** Be sure that the web browser on the Manager PC is not configured to use a proxy server in the Internet settings. In Windows Internet Explorer, you can check if a proxy server is enabled using the following procedure:
>
> 1. In Windows, click on the START button, go to Settings and choose Control Panel.
> 2. In the Control Panel window, double-click on the Internet Options icon.
> 3. Click the Connections tab and click on the LAN Settings button.
> 4. Verify that the "Use proxy server" option is NOT checked. If it is checked, click in the checked box to deselect the option and click OK.

To use the web-based management software, launch a suitable web browser and direct it to the IP address of the Router. Type in **http://** followed by the default IP address, **192.168.0.1** in the address bar of the browser. The URL in the address bar should read: **http://192.168.0.1**.

In the page that opens, click on the **Login to web-based management module** button in the center.

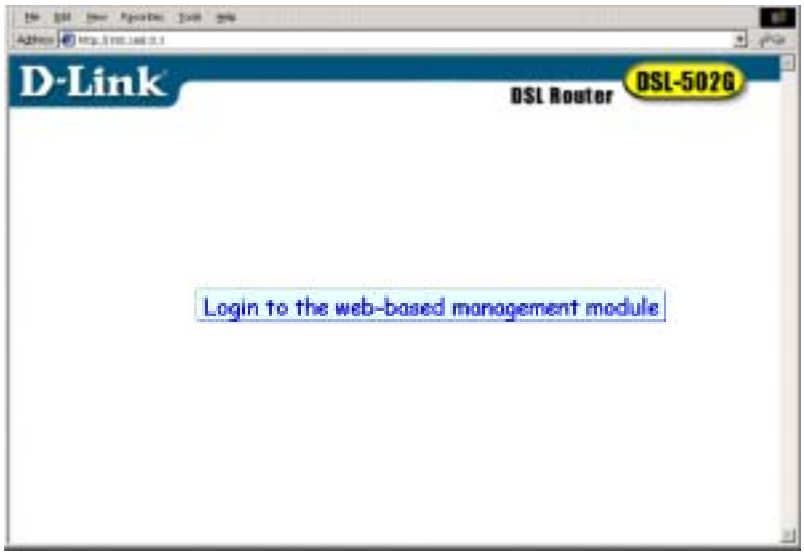


Figure 5. Login to Web Configuration Manager

A new window will appear and you will be prompted for a user name and password to access the web-based manager. Use the default user name **admin** and password **admin** for first time set up. You should change the web-based manager access user name and password once you have verified that a connection can be established. The user name and password allows any PC within the same subnet as the Router to access the web-based manger.

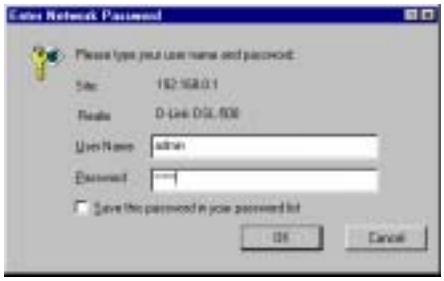


Figure 6. Access Router Web Configuration Manager

Note: Do not confuse the user name and password used to access the web-based manager with the ADSL account user name and password needed for PPP connections to access the ADSL or network service provider's network.

Logging in will bring up the Router/Bridge Configuration window of the web-based management module. In this window, you will see the D-Link DSL-502G folder is open revealing its contents of three subfolders. These subfolders contain menu buttons you can click on to see various menu screens used to configure the device for connection to the WAN and other functions.

Figure 7. Web-based Manager Main Menu – First Time Log On

Configure the WAN Connection

Now that you have accessed the web-based manager, you can configure the device for the WAN connection. For PPPoE and PPPoA connections, you will need to provide a User Name and Password used by your ISP for authentication purposes. For "Bridged Ethernet" (RFC 1483) connections, a static IP address must be used. It is necessary to supply IP settings for the WAN connection and other information discussed in Chapter 2, *Prepare for Installation.*

All connection methods available to the Router are discussed in this chapter, beginning with PPPoA connections. PPPoA is the default method used by the Router.

If you are using a PPPoE, IPoA, or Bridged Ethernet (RFC 1483) connection, it is necessary to change the connection method. Please read *Changing the Connection Type* following the *PPPoA Connections* section for more information.

PPPoA Connections

The default connection method used by the Router is Point-to-Point-Protocol over ATM (PPPoA). In the PPPoA Configuration window, you must enter the user name and password for network account authentication and verification. When this information is entered, the changes must be saved and the Router restarted.

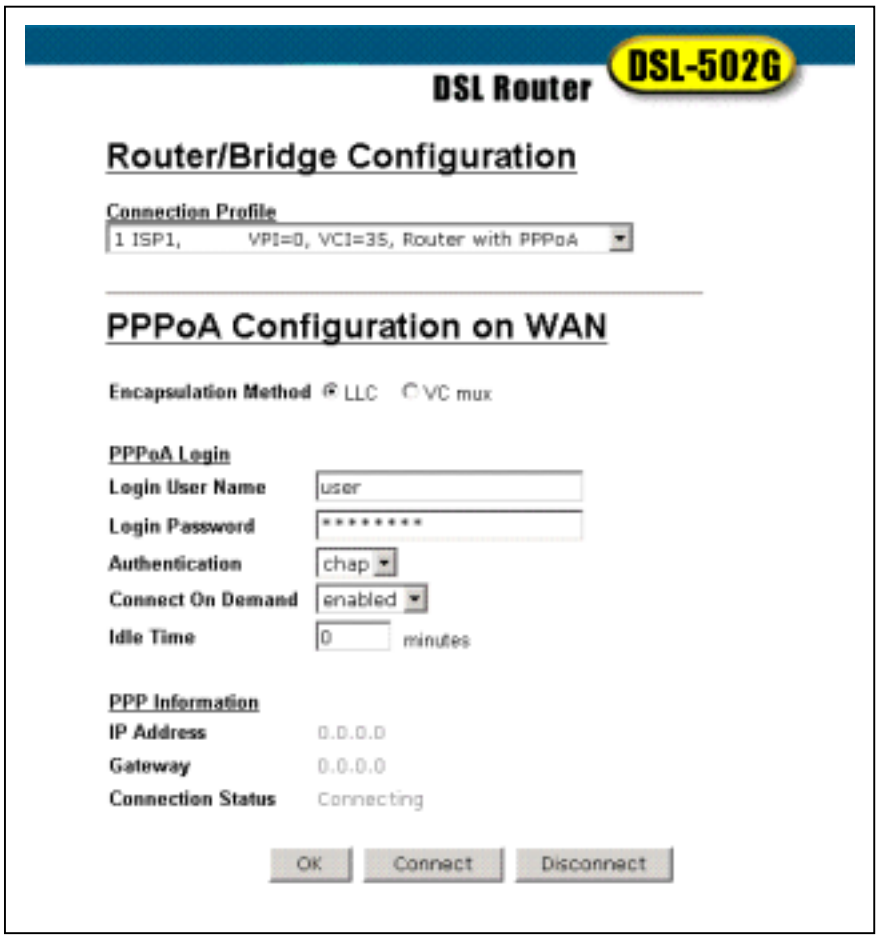


Figure 8. Router/Bridge Configuration - PPPoA

In the **Bridge/Router Configuration** window, follow these steps to establish the WAN connection using PPPoA:

Under **PPPoA Login**, enter the **Login User Name** used for your network account. The user name and login password, are used to authenticate the identity of the ADSL client and provide access to the service provider's network. The user name and login password can be any combination of up to 64 characters.

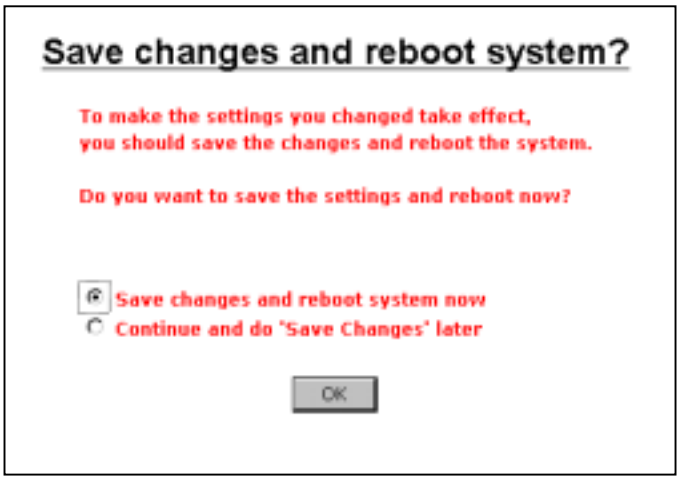
Enter the Login Password.

Unless you are instructed to use a different **Authentication** method, leave the default **chap** protocol selected. The alternative method, **pap**, can be selected from the pull-down menu if required by the service provider.

Leave the **Connect on Demand** option as **enabled** in the pull-down menu. This will allow the Router to establish a WAN connection upon restarting.

Leave **Idle Time** set to the default value 0.

Click on the **OK** button on the bottom of the window. A new screen appears:


Save changes and reboot system?
To make the settings you changed take effect,
you should save the changes and reboot the system.
Do you want to save the settings and reboot now?
Save changes and reboot system now
Continue and do 'Save Changes' later
OK

The **Save changes and reboot system?** message prompt offers two option:

A. You can save the configuration changes and restart the device now by clicking OK; or,

B. If you want to change the user name and password used to access the Web Manager, select the "Continue and do 'Save Changes' later" option and click OK, and go to the System Username and Password menu in the Maintenance folder.

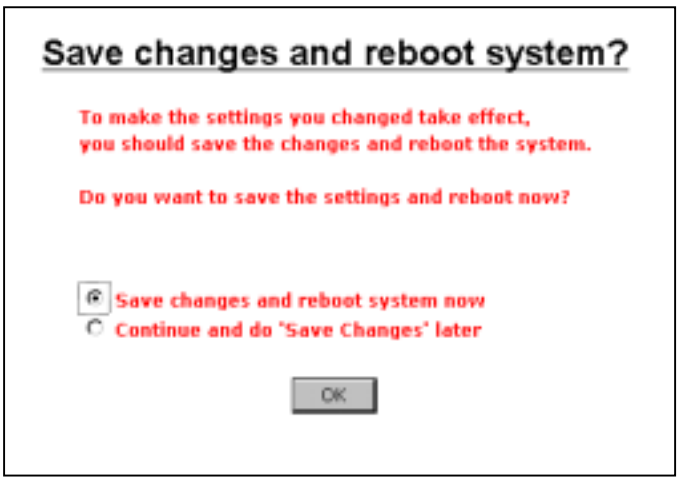
Changing the Connection Protocol

The default connection method used by the Router for the WAN connection is PPP over ATM. If you wish to use this method, it is not necessary to change this setting. However, if you will use a static IP address for a "Bridged Ethernet" (RFC 1483) connection, PPP over Ethernet or IPoA you must change the connection method.

There are two menus used to change the connection method or connection profile. The Bridge/Router Configuration menu, the first screen that appears when you log in, can be used to configure the device to use one of the three available methods. This procedure is described below. The connection profile can also be changed using the Connection Profile menu, this is described in its own section in Chapter 5.

To change the connection profile using the Bridge/Router Configuration menu, follow these steps:

1. In the **Bridge/Router Configuration** window, use the drop-down menu under **Connection Profile** to select an alternative connection method. The alternative connection options are **Bridge with RFC 1483**, **Router with PPPoE** and **Router with IPoA**. You will also see the VPI and VCI values listed here.
2. Click on the **OK** button on the bottom of the window. A new screen will appear:


Save changes and reboot system?
To make the settings you changed take effect,
you should save the changes and reboot the system.
Do you want to save the settings and reboot now?
Save changes and reboot system now
Continue and do 'Save Changes' later
OK

The **Save changes and reboot system?** message prompt offers two option:

A. You can save the configuration changes and restart the device now by clicking OK; or,

B. If you want to change the user name and password used to access the Web Manager, select the "Continue and do 'Save Changes' later" option and click **OK**, and go to the System Username and Password menu in the Maintenance folder.

PPPoE Connections

Although the connection methods differ significantly, from the viewpoint of the ADSL subscriber, there is little difference between the two variations of PPP connections. The information entered for PPPoE connections is the same as that used for PPPoA connections.

Once you have changed the connection method to PPPoE, saved the configuration change and restarted the device, you can proceed to enter authentication information used to connect to the WAN. Follow these steps:

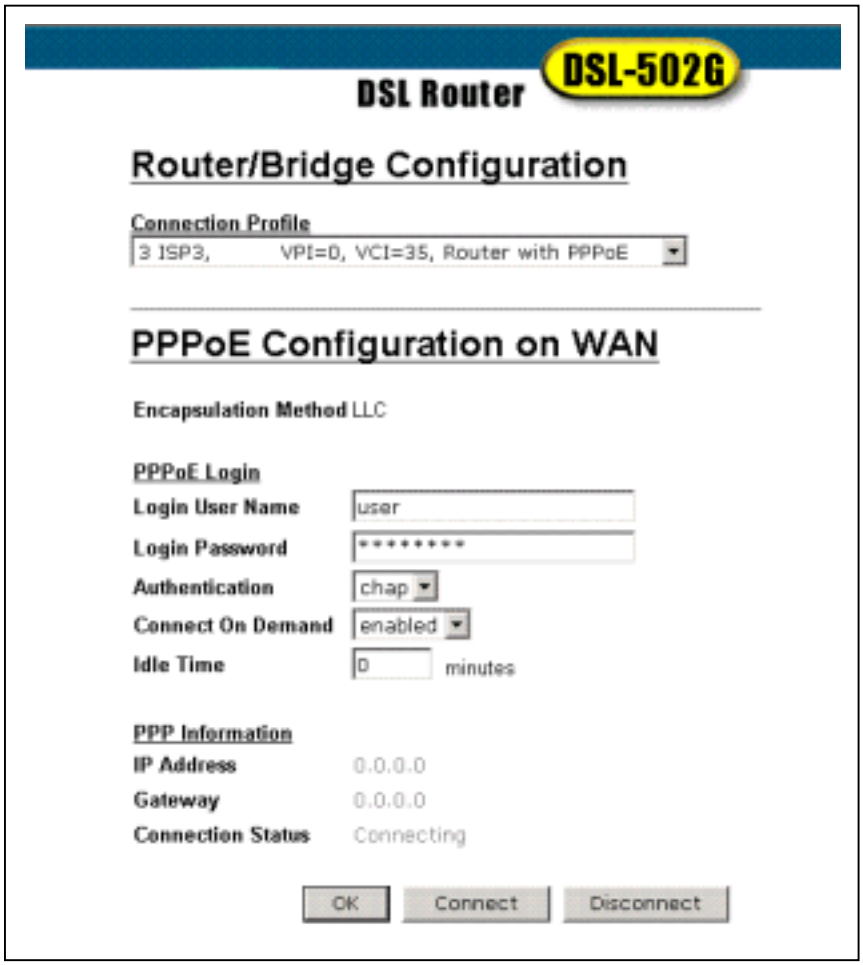


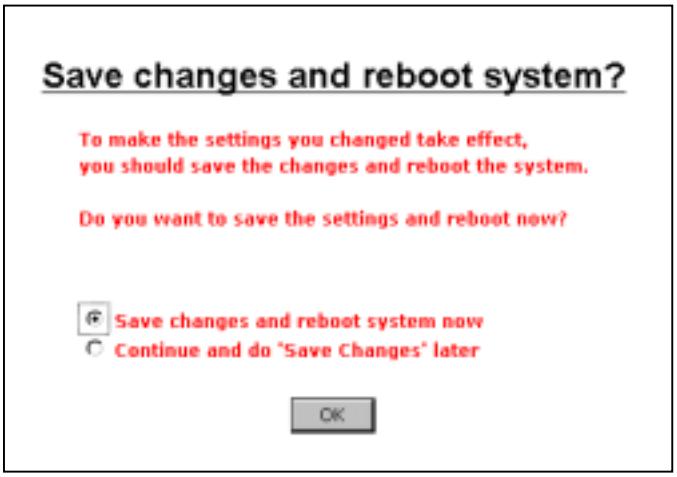
Figure 9. Router/Bridge Configuration - PPPoE

1. Under **PPPoE Login**, enter the **Login User Name** used for your network account. The user name and login password, are used to authenticate the identity of the ADSL client and provide access to the service provider's network. The user name and login password can be any combination of up to 64 characters.
2. Enter the Login Password.
3. Unless you are instructed to use a different **Authentication** method, leave the default **chap** protocol selected. The alternative method, **pap**, can be selected from the pull-down menu if required by the service provider.

Leave the **Connect on Demand** option as **enabled** in the pull-down menu. This will allow the Router to establish a WAN connection upon restarting.

Leave **Idle Time** set to the default value 0.

Click on the **OK** button on the bottom of the window. A new screen appears:


Save changes and reboot system?
To make the settings you changed take effect,
you should save the changes and reboot the system.
Do you want to save the settings and reboot now?
Save changes and reboot system now
Continue and do 'Save Changes' later
OK

The **Save changes and reboot system?** message prompt offers two option:

A. You can save the configuration changes and restart the device now by clicking OK; or,

B. If you want to change the user name and password used to access the Web Manager, select the "Continue and do 'Save Changes' later" option and click **OK**, and go to the System Username and Password menu in the Maintenance folder.

RFC 1483 Bridged Ethernet Connections

If you are using the "Bridged Ethernet" method for the WAN connection, the global IP settings must be configured in another device. When using this connection method, the device functions as a bridge, so it is does not perform any IP functions. The device will have a IP address on the LAN, but not on the WAN interface. After changing the connection profile to **Bridge with RFC 1483**, you will need to configure the PC or server connected to the DSL-502G so the WAN interface a way to obtain a global IP address. This can be accomplished in different ways according to the circumstances of your network and the nature of your ADSL subscriber account. Your network service provider will give you instructions or additional computer software as needed to handle global IP settings for your account.

IPoA Connections

IPoA connections may require that global IP settings be configured for the device manually or be configured to use DHCP to obtain these settings. If you are instructed to set the WAN IP address manually or use DHCP, read the *IPoA Configuration* section of Chapter 5. Otherwise, the connection will be established upon restarting the device.

Changing the User Name and Password

Before you configure the Router and connect to the WAN you should change the user name and password used to access the web-based manager. Open the Maintenance folder and click on the System Username and Password button to change the manager username and password.

Figure 10. User Name and Password Menu

1. Type the current **User Name** in the entry field provided.

Type in the current password in the **Old Password** entry field.

Type in the **New Password** in the entry field provided.

Type in the new password again in the **Confirm New Password** field.

Click the **OK** button.

The **Save changes and reboot system?** message appears:

A. You can save the configuration changes and restart the device now by clicking OK; or,

B. If you want to change the user name and password used to access the Web Manager, select the "Continue and do 'Save Changes' later" option and click **OK**.

Connect to WAN

Once you have configured the Router, saved changes and restarted it, you can connect the manager PC to the Internet. The procedure is the same for PPPoE and PPPoA connections.

Connect with PPP (PPPoE and PPPoA)

If you have enabled the Connect on Demand feature, the Router will have established the WAN connection upon restarting.

If the Connect on Demand feature has been disabled, click the **Connect** button to initiate the PPP connection via the ADSL WAN interface. The "handshake" process will take a few seconds.

In the PPPoE or PPPoA Configuration widow, viewing the **Connection Status** *Connected*, under **PPPoE Information** or **PPPoA Information** will indicate a valid connection. A valid ADSL connection can also be confirmed by observing the LED indicators on the front panel of the device.

Disconnect PPP

For PPP connections. the WAN connection can be terminated at any time by clicking on the **Disconnect** button in the PPPoE or PPPoA Configuration window. It is recommended that you disconnect the ADSL connection and change the user name and password used to access the web-based manager. Then set up the rest of your network.

Connect with IPoA (RFC 1577)

IP over ATM connections may require global IP settings for the device. Your service provider will give you IP settings information if needed. Some IPoA connections function like peer-to-peer connections and therefore do not require IP settings on the WAN interface.

Connect with RFC 1483

Upon restarting the device, it will serve as a bridge, and therefore it will not have any IP (Layer 3) function on the WAN interface. Your network service provider will instruct you on what further steps are needed to establish the WAN connection. You may have to install software on your PC or you may be required to alter the IP settings of the NIC adapter on your PC.

You will notice that the configuration options have changed. Please read *Bridge with RFC 1483* in Chapter 5 for more information on bridge configuration.

5

Web-based Management

The DSL-502G offers a web-based (HTML) graphical user interface allowing users to manage the Router from anywhere on the LAN using a standard browser, software such as Netscape Navigator or Microsoft Internet Explorer. The web browser is used for direct communication with the Router using HTTP protocol.

Accessing the Web Manager

In order to access the web-based management interface it will be necessary to have both the manager's PC and the Router on the same IP subnet. If the manager PC is configured as a DHCP client, the Router will automatically assign IP settings. If you choose to disable the DHCP function, it will be necessary to either change the IP settings of the PC or change the IP address of the Router. See Chapter 6 for information about assigning IP addresses on the network and changing the IP address of the device using the console interface.

To use the web-based management software simply run the browser you have installed on your computer and point it to the IP address defined for the device. The first time you access the web-based manager you will need to type the default IP address, **192.168.0.1** in the address bar of the browser. The URL in the address bar should read: **http://192.168.0.1**. If you change the IP address you will use the new IP address to access the web-based manager.

In the page that opens, click on the **Login to web-based management module** button.

A new window will appear and you will be prompted for a user name and password. Use default user name **admin** and password **admin** for first time set up.

Figure 11. User Login

Note: Be sure that the web browser on the Manager PC is not configured to use a proxy server in the Internet settings. In Windows Internet Explorer, you can check if a proxy server is enabled using the following procedure:

1. In Windows, click on the START button, go to Settings and choose Control Panel.

2. In the Control Panel window, double-click on the Internet Options icon.

3. Click the Connections tab and click on the LAN Settings button.

4. Verify that the "Use proxy server" option is NOT checked. If it is checked, click in the checked box to deselect the option and click OK.

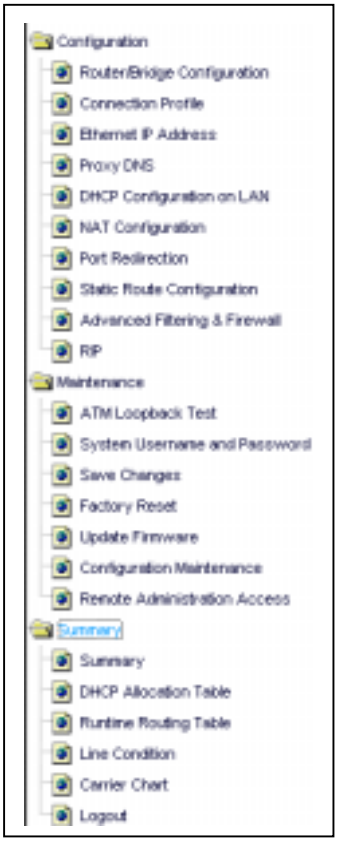
Web Manager Interface

Once you have successfully logged on to the web manager, your browser will display the Bridge/Router Configuration menu. If you wish to change the connection method used by the device, please see *Changing the Connection Method* in the Chapter 4.

Figure 12. Router/Bridge Configuration (PPPoA)

Folders and Menus

The web manager interface is divided into two sections, the left side displays an open folder labeled D-Link DSL-502G. The subfolders inside are labeled Configuration, Maintenance and Summary. The contents of these subfolders differs depending on the connection profile of the device. The figure to the right reveals the contents of the folders when the device is configured to serve as a router (Router with PPPoA or PPPoE connections). The next section, *Router with PPP Configuratio*n, instructs you on how to use the web manager for configuration of the DSL-502G functioning as a router. For device configuration of bridged (RFC 1483) connections, skip ahead to *Bridge with RFC 1483 Configuration*.



Router Configuration Menus

Adding a New Connection Profile

Use the Connection Profile menu to add, change or delete connection profiles. This menu is used to change the VPI/VCI settings for the device.

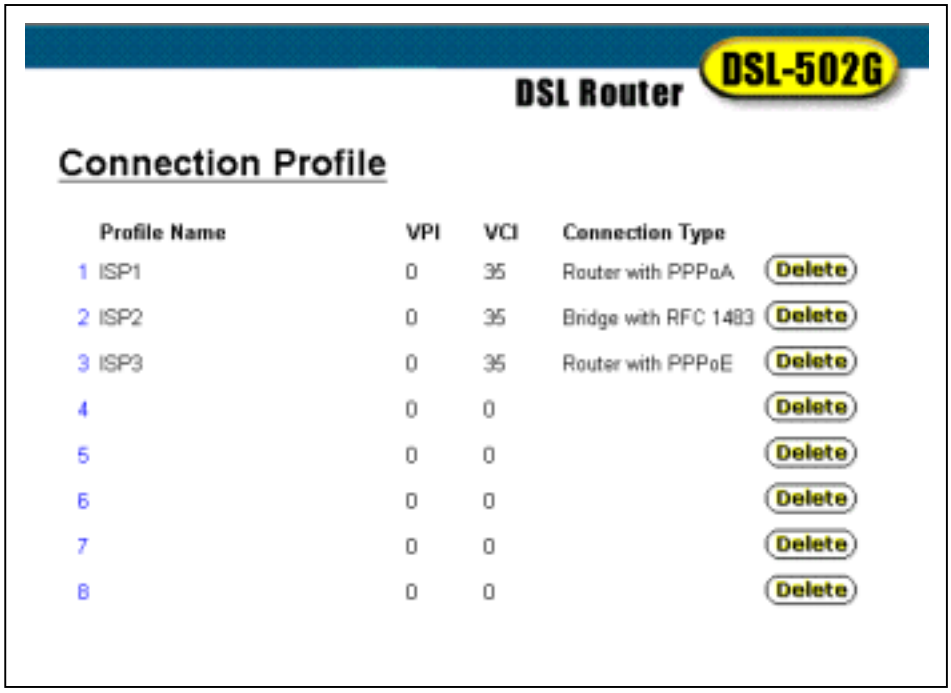


Figure 13. Connection Profile Menu

The Connection Profile screen contains a numbered list of existing profiles is as follows:

Profile Name	Connection profile name
VPI	Virtual Path Identifier
VCI	Virtual Channel Identifier
Connection Type	The functional role of the DSL-502G and connection protocol used

A profile may be deleted by clicking on the **Delete** button for that profile. To change an existing profile click on the number for that profile Connection Profile Configuration menu will appear. To add a new profile, click on an unused number to see the Connection Profile Configuration menu.

New Connection Profile Configuration

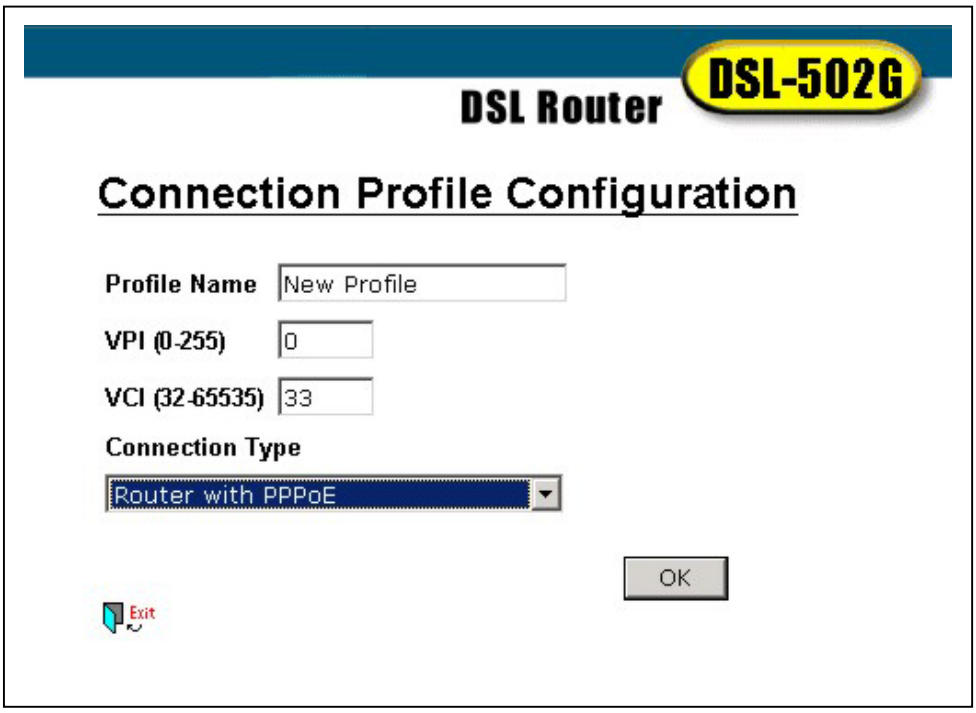


Figure 14. Connection Profile Configuration

Use the Connection Profile Configuration menu to change the following parameters:

Profile Name	Type in a new name for this profile.
VPI	Type in the new VPI setting (*0-255*)
VCI	Type in the new VCI setting (*32-65535*)
Connection Type	From the drop-down menu select *Router with PPPoA*, *Router with PPPoE*, *Router with IPoA*, or *Bridge with RFC 1483*

When all the changes have been made, click on the **OK** button. You will be prompted to save the changes and reboot the device.

To return to the Connection Profile Screen, click the Exit icon.

Note: The VPI and VCI numbers are assigned by the network service provider. These values should not be changed unless you are instructed to do so. Incorrect VPI or VCI settings will not allow the device to connect to the WAN.

IP Address on LAN

Use this menu to change the LAN IP address of the Router.

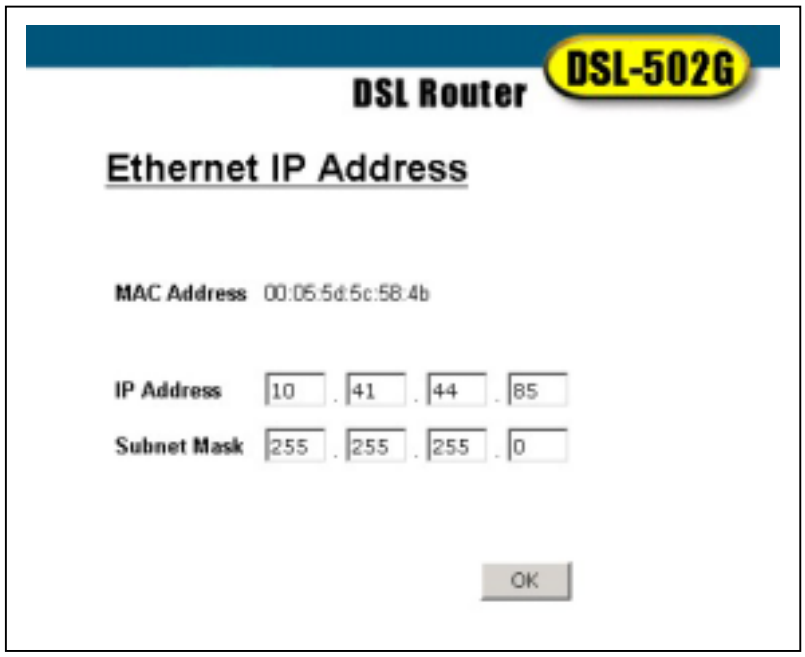
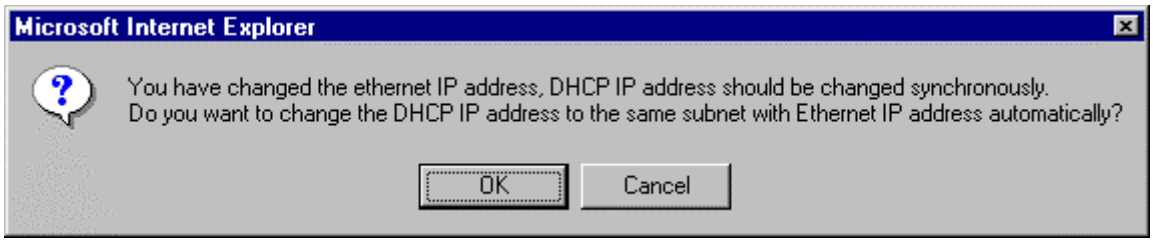


Figure 15. Ethernet IP Address Menu

The Ethernet IP Address displays the current LAN IP settings of the Router. To change the IP address, type in the new **IP Address** and **Subnet Mask** in the spaces provided and click on the **OK** button. If DHCP is enabled, a screen prompt will appear:


Microsoft Internet Explorer
You have changed the ethernet IP address, DHCP IP address should be changed synchronously.
Do you want to change the DHCP IP address to the same subnet with Ethernet IP address automatically?
OK
Cancel

If you will continue to use the DHCP function, click the **OK** button.

You will be prompted again to restart the device. Restart now or continue to make changes and save the changes later.

Router Configuration

The DSL-502G serving as a router has a different role than it does when it is configured to be a bridge. This section discusses the different menus used for configuration when it serves as a router. The device is configured as a router when using a connection profile characterized by a PPPoE, PPPoA or IPoA connection.

PPP Configuration (PPPoE & PPPoA)

The first menu displayed is the Router/Bridge Configuration menu. You may access this window at any time by clicking on the first button in the Configuration folder.

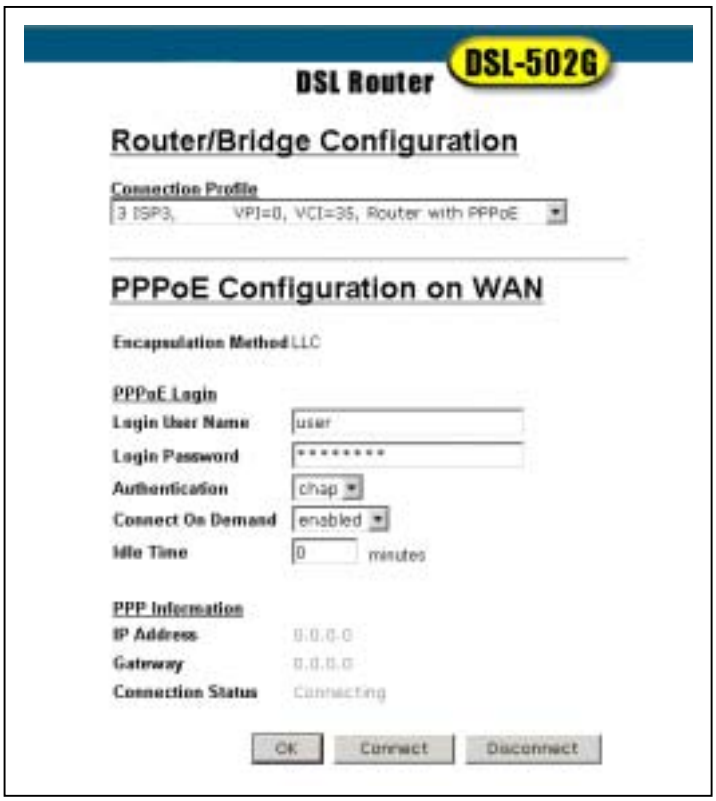


Figure 16. Router with PPP Configuration Menu

The PPP Configuration menu presents the following user defined parameters:

Connection Profile	Drop-down menu used to change connection method.
Login User Name	Used for authentication by your network service provider.
Login Password	Used for authentication by your network service provider
Authentication	Protocol used to confirm the identity of the subscriber. Choose chap (default) or pap form the drop-down menu.
Connect on Demand	Select enabled or disabled. When this function is enabled the router will connect any workstation on your LAN to the Internet upon request. If this function is disabled, it will be necessary to access this menu and hit the Connect button each time you want to establish a connection to the WAN or the Internet.
Idle Time	This means that the Router is always connected and able to connect on demand. If your network account is billed according to the amount of time the Router is actually connected to the Internet, enter an appropriate Idle Time value (in seconds). This will disconnect the Router after the WAN connection has been idle for the amount of time specified. The default value = 0.

When you finished making changes to the PPP configuration, click the **OK** button to save the changes. It will be necessary to restart the Router for the new configuration to go into effect.

PPPoE Information

This read-only field provides information regarding the status of the Router connection to the WAN. The global **IP Address** for the Router should be assigned automatically by the network service provider's PPP server. The **Connection Status** will read Disconnect until the Router has established the WAN connection.

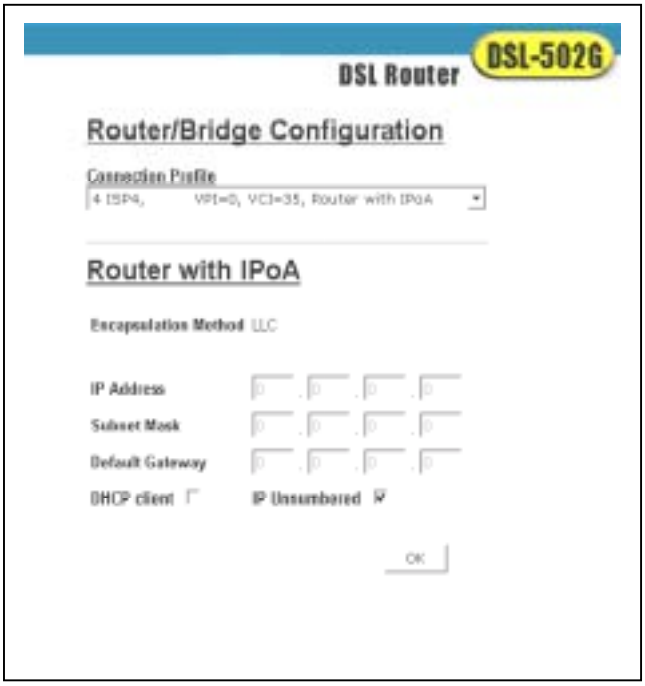
Connect to WAN

If you have enabled the Connect on Demand feature, the Router will have established the WAN connection upon restarting.

If the Connect on Demand feature has been disabled, click the **Connect** button to initiate the PPP connection via the ADSL WAN interface. The "handshake" process will take a few seconds. To sever the WAN connection, click on the **Disconnect** button.

IPoA Configuration

The IP over ATEM connection method uses a different method to connect to the WAN. Some IpoA connections operate in a way similar to peer-to-peer connections, and therefore do not require a global IP address for the WAN interface. Some networks using IpoA do require global IP settings. In this case the settings are assigned manually or by DHCP. The default configuration for IpoA is peer-to-peer connection, that is, global IP settings are not required.



Router with IPoA Configuration

For peer-to-peer network connections, check the IP Unnumbered box (checked by default) and click OK.

For DHCP service, check the DHCP client box and click OK.

To assign the global IP settings manually, type the IP Address, Subnet Mask and Default Gateway IP settings given assigned by your network service provider, and click OK.

Clicking OK will bring up the Save and reboot system.

Proxy DNS Settings

You may use the Router to provide DNS services for work stations on your LAN. To configure on-board DNS, click on the Proxy DNS button.

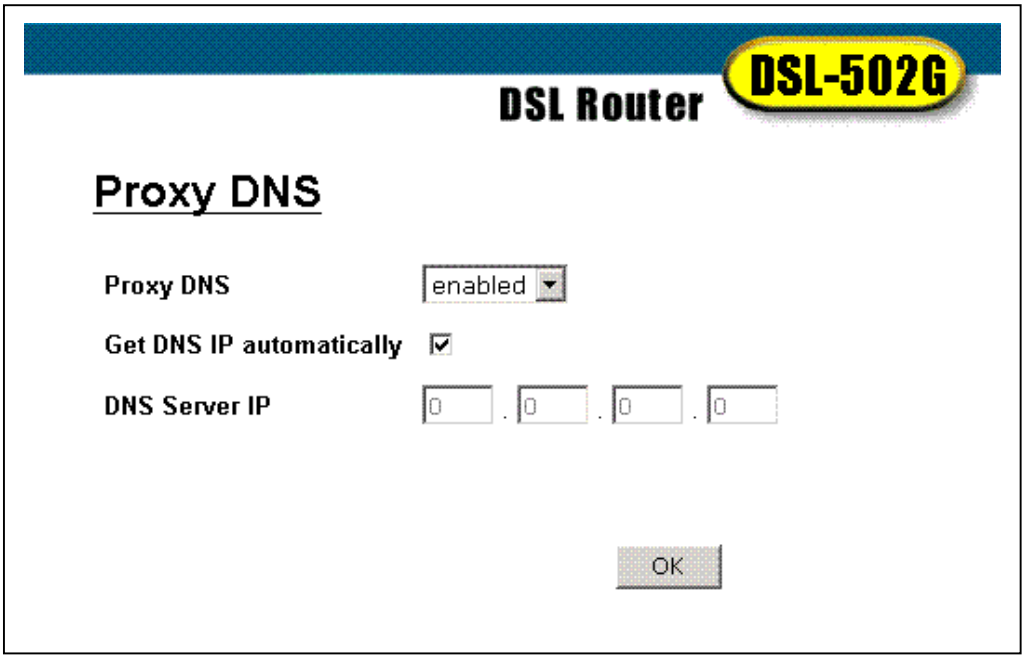


Figure 17. Proxy DNS Menu

The Proxy DNS Menu presents the following user defined parameters:

Proxy DNS	Choose *enabled* or *disabled* from the drop down menu to enable or disable the proxy DNS function. Default = enabled.
Get DNS IP automatically	Click in the box to use (checked) or not use (unchecked) automatic DNS detection. Using automatic DNS detection not allow you to select a DNS server. Default = auto detect.
DNS Server IP	Type in the IP address of the DNS server you want to use (DNS auto detect must be disabled).

When you are finished making changes to the Router DNS settings click on the **OK** button. You must save the changes and restart the device for the settings to go into effect.

DHCP Configuration

Us e the DHCP Configuration on LAN menu to configure the Router to act as a DHCP server for the LAN.

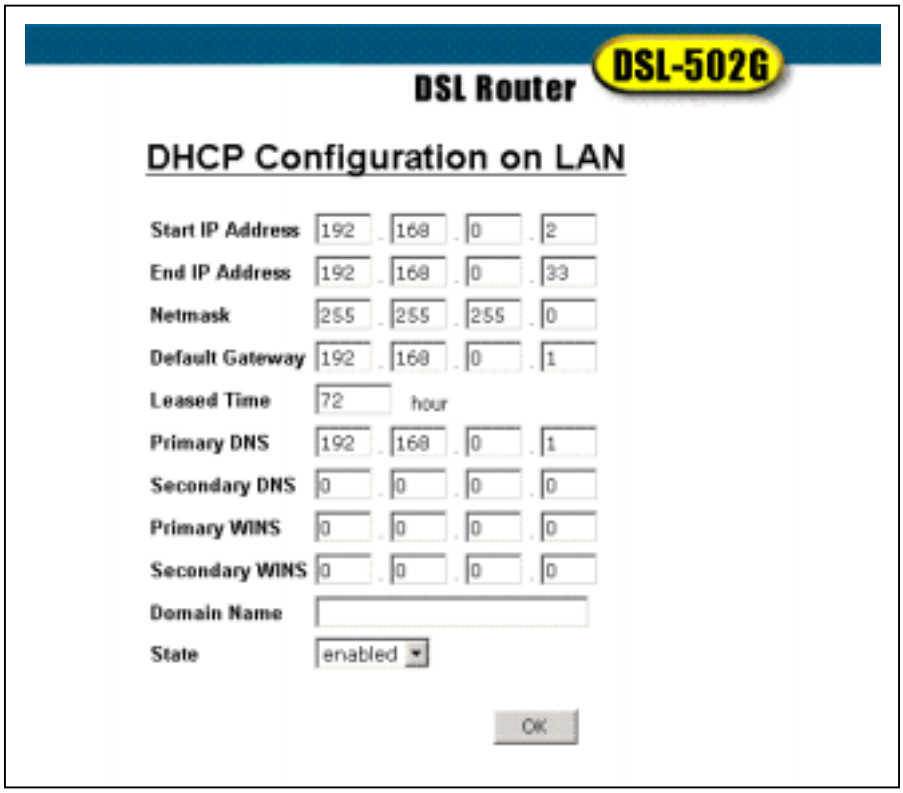

DSL Router
DSL-502G
DHCP Configuration on LAN
Start IP Address 192 168 0 2
End IP Address 192 168 0 33
Netmask 255 255 255 0
Default Gateway 192 168 0 1
Leased Time 72 hour
Primary DNS 192 168 0 1
Secondary DNS 0 0 0 0
Primary WINS 0 0 0 0
Secondary WINS 0 0 0 0
Domain Name
State enabled
OK

Figure 18. DHCP Configuration Menu

Configure LAN DHCP services by defining the following parameters:

Start IP Address	Type in the base address for the IP pool of unassigned IP addresses.
End IP Address	Type in the last address of the contiguous IP address range to be used by the Router for DHCP function.
Netmask	Type in a subnet mask IP address.
Default Gateway	Type in the Default Gateway IP Address that will be assigned to and used by the DHCP clients.
Leased Time	This specifies the amount of time (in hours) a client can lease an IP address, from the dynamically allocated IP pool.
Primary DNS	Enter any Internet DNS server IP address available through the WAN connection or use the DNS settings supplied by your service provider.
Secondary DNS	Enter a backup DNS IP address or leave blank.
Primary WINS	Some LANs may require using WINS servers, enter the IP address of the WINS server or leave blank.
Secondary WINS	Enter a back-up WINS server IP address or leave blank.
Domain Name	Enter a domain name for the network group or leave blank.
State	Default = enabled. If you wish to disable the DHCP function, select *disabled* from the drop-down menu.

NAT Configuration

Network Address Translation (NAT) is a routing protocol that allows your network to become a *private* network that is isolated from, yet connected to the Internet. It does this by changing the IP address of packets from a *global* IP address usable on the Internet to a *local* IP address usable on your private network (but not on the Internet) and vice-versa. The Router allows up to 128 host IP addresses.

NAT has two major benefits. First, NAT allows many users to access the Internet using a single global IP address. This can greatly reduce the costs associated with Internet access and helps alleviate the current shortage of Internet IP addresses. Secondly, the NAT process creates an added degree of security by hiding your private network behind one IP address. The NAT function will normally only allow incoming packets that are generated in response to a request from a host within the LAN.

If your network uses web servers, FTP servers or other proxies used for data requests from outside the private network, you can use NAT in conjunction with Port Redirection to allow appropriate use of your servers by outside users. See the section on Port Redirection for more information.

For the purposes of network administration, NAT is almost indispensable. Hosts and servers on the internal network can be moved easily. Using NAT together with DHCP can greatly reduce the workload of a network manager while allowing tremendous flexibility.

To view the NAT Configuration menu, click on the NAT Configuration button:

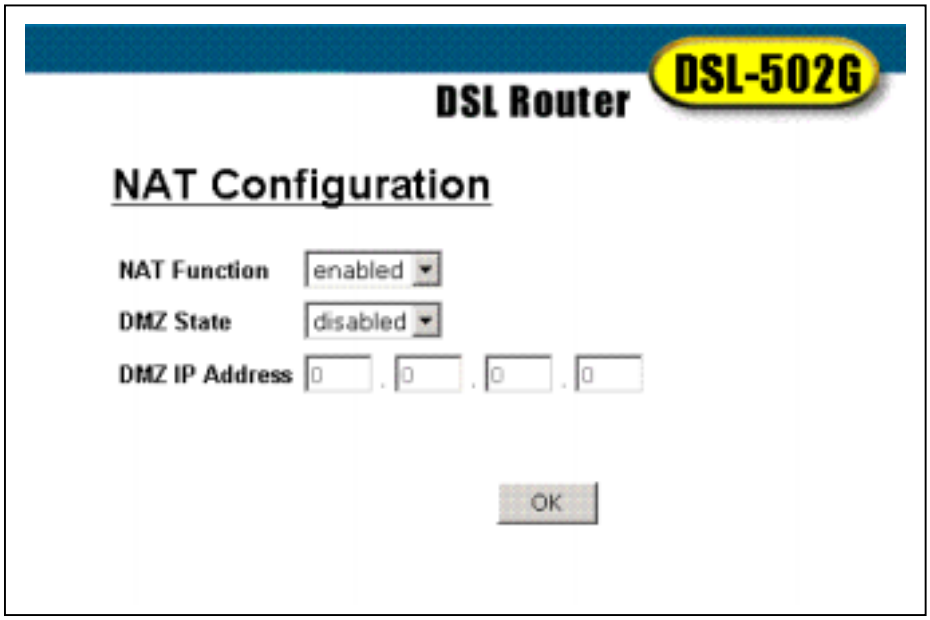


Figure 19. NAT Configuration Menu

The following parameters can be configured using the NAT Configuration menu:

NAT Function	Default = enabled. Select *enabled* or *disabled* to enable or disable the NAT function.
DMZ State	Default = disabled. Select *enabled* or *disabled* to enable or disable the DMZ function.
DMZ IP Address	With the DMZ State enabled, type in the LAN IP address of a designated DMZ device (see explanation below).

DMZ IP Address

NAT may conflict with certain interactive applications such as video conferencing or playing Internet video games. For these applications, a NAT bypass can be set up using a DMZ IP address. The DMZ IP address is a "visible" address and does not benefit from the full protection of the NAT function. Therefore it is advisable that other security precautions be enabled to protect the other computers and devices on the LAN. It may be wise to use isolate the device with the DMZ IP address from the rest of the LAN.

For example, if you want to use video conferencing and still use NAT, you can use the DMZ IP address function. In this case, you must have a PC or server through which video conferencing will take place. The IP address of this PC or server will then be the DMZ IP address. You can designate the server's IP address as the DMZ by typing in the IP address in the **DMZ IP Address** space provided and clicking the **OK** button.

Port Redirection

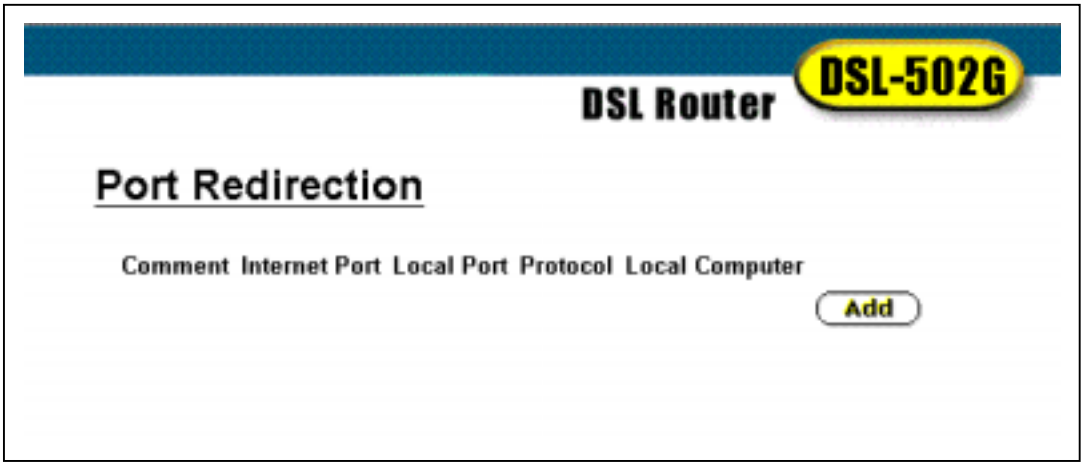


Figure 20. Port Redirection Add Menu

The Port Redirection feature of the Router is used in conjunction with NAT to improve security and efficiency. Port redirection can be used to direct potentially hazardous packets to a proxy server outside your firewall. For example, it is common practice to direct HTTP packets to a designated HTTP server in the DMZ. Other common applications might include directing incoming SMTP packets to an Email server for data scrutiny and improved network efficiency. Click the **Add** button in the Port Redirection window to access the Redirect Port - Add menu.

Port Redirection (continued)

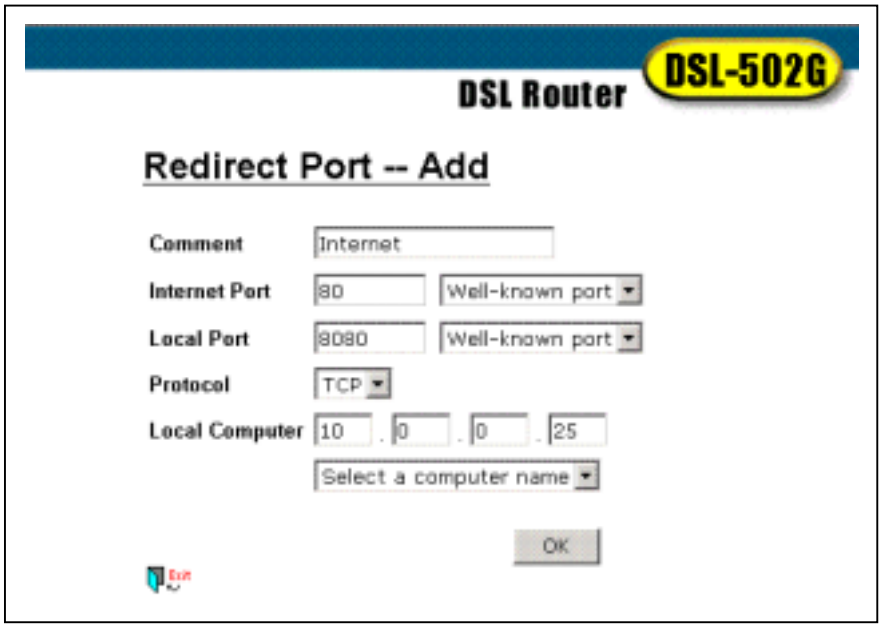


Figure 21. Redirect Port – Add Menu

The Redirect Port window presents eight entry fields:

Comment	Assign an appropriate name to the new route.
Internet Port	Enter the designated TCP or UDP protocol port number or use a well-know port for the particular protocol packet you wish to redirect.
Well-known port	Select one of the well-known ports to redirect incoming packets through that port.
Local Port	Enter the port number used by the designated host on the LAN or use a well-known port.
Well-known port	Select one of the well-known ports to redirect incoming packets through that port on the local host.
Protocol	Choose the protocol either TCP or UDP from the drop-down menu.
Local Computer	Enter the IP address of the local designated host computer or device.

Click the **OK** button when the port redirection parameters have been entered. You can save and reboot the system now, or if you want to add more redirection sets, choose to save later and click the Exit icon to go back to the previous menu.

Static Route Configuration

Use Static Routing to specify a route used for data traffic within your LAN. This can be used to specify that all packets destined for a particular subnet use a predetermined gateway.

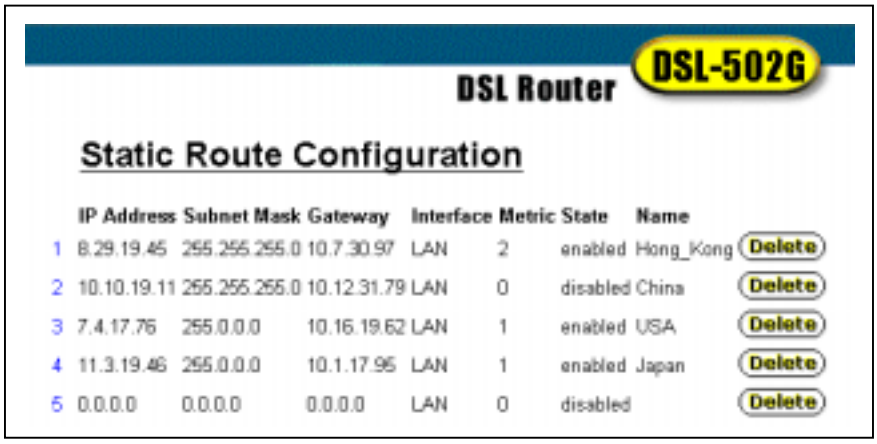

DSL Router
DSL-502G
Static Route Configuration
IP Address Subnet Mask Gateway Interface Metric State Name
1 8.29.19.45 255.255.255.0 10.7.30.97 LAN 2 enabled Hong_Kong Delete
2 10.10.19.11 255.255.255.0 10.12.31.79 LAN 0 disabled China Delete
3 7.4.17.76 255.0.0.0 10.16.19.62 LAN 1 enabled USA Delete
4 11.3.19.46 255.0.0.0 10.1.17.95 LAN 1 enabled Japan Delete
5 0.0.0.0 0.0.0.0 0.0.0.0 LAN 0 disabled Delete

Figure 22. Static Route Configuration Table

Up to 18 static route configurations can be entered into the table. To eliminate an existing static route configuration, click the **Delete** button for that configuration.

The information listed for the static route configuration is as follows:

IP Address	IP address of the subnet or device where packets are routed.
Subnet Mask	Subnet mask that allows packets to be routed as intended.
Gateway	IP address of the gateway used for this static route.
Interface	LAN interface.
Metric	Maximum number of hops allowed for the static route.
State	Route is enabled or disabled.
Name	Name of the subnet or static route used.

To modify an existing route configuration, click on the blue number hyperlink for the route. To define a new route, click on an unused static route configuration number to see the configuration menu.

Static Route Configuration – Modify/Add

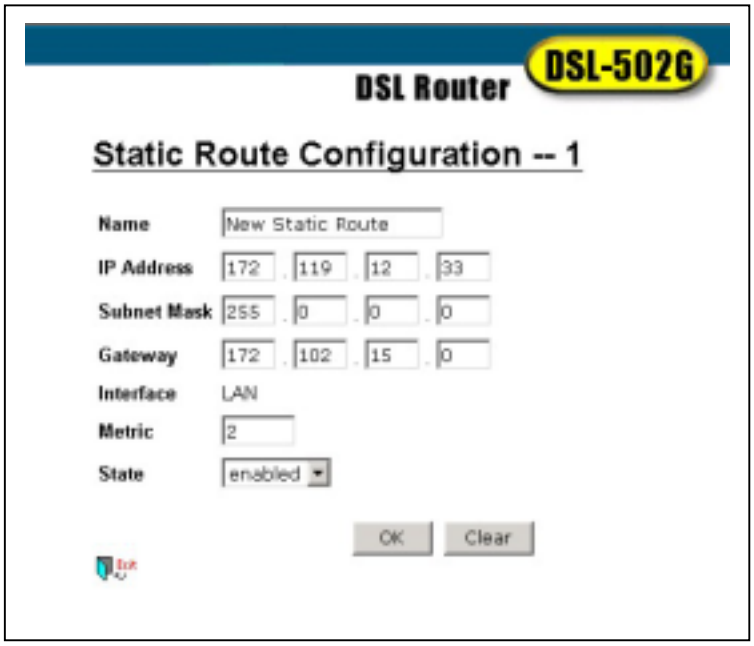


Figure 23. Static Route Configuration Menu

To add or modify a static route, define the following parameters:

Name	Provide a name for the static route or subnet (optional).
IP Address	Type in the IP address of the subnet or device where packets are routed.
Subnet Mask	Type in an appropriate subnet mask that allows the static route to function.
Gateway	Type in the IP address of the gateway used for traffic destined for the specified subnet or device.
Metric	Type in the maximum number of hops allowed for the static route.
State	Enable of disable the route using the drop-down menu.

Click on **OK** to put the static route into the table. It will appear in the Static Route Table shown previously.

To clear the settings for this configuration, click the **Clear** button.

To return to the Static Route Table, click the Exit icon.

Advanced Filter & Firewall

One of the most important elements of any network security implementation is the firewall. Packet filtering is a basic firewall security measure and should be used on any network that is exposed to security risk. A packet filter system examines data packets and scrutinizes them in order to control network access. Filtering rules determine whether packets are passed through the Router from either side of the gateway. The rules are created and controlled by the network administrator and can be precisely defined. These rules are used to block access to the LAN from outside the network and/or to deny access to the WAN from within the network. The Router uses filtering rules to examine data packet headers for specific information. Packets passing through the Router that do not meet the criteria specified by the rule set are dropped.

In order to improve network security without severely limiting network efficiency, it is important to carefully plan the sets of access rules. Effective implementation of packet filtering requires detailed knowledge of network services and communication protocols. An overly complicated filtering scheme can adversely effect routing performance, while an inadequate set of rules may needlessly compromise security.

Packet filtering can be used in conjunction with NAT, port redirection and proxy servers to help provide basic firewall protection. However, these measures do not address many security issues and should be used as only one part of an overall network security strategy. It is important to remember that IP packet filtering examines only the packet header and is not concerned with application information. Therefore, packet filtering does not protect against higher-level security threats that may operate at the application or other level.

Filtering rules can be precisely defined based upon source and destination IP address, as well as port and protocol information. Up to four filter sets can be used; each set contains up to sixteen filtering rules subsets.

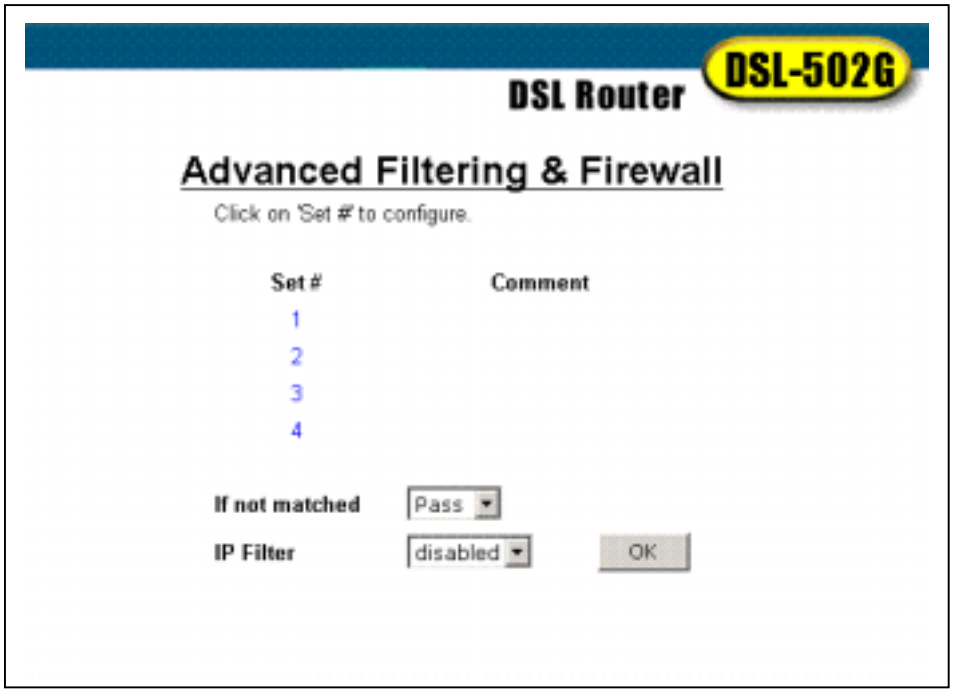


Figure 24. Filter & Firewall Menu 1

The first Filter & Firewall menu lists the four filtering sets, each followed by an identifying comment. Below the list are two drop-down menus. The filtering sets are sets of filtering rules defined in the menus shown below.

When you are finished defining the rules for each set, use the **If not matched** menu to select *Pass* or *Block* for all the sets listed. From the **IP Filter** menu, select *enabled* or *disabled* to enable or disable the listed filtering sets. When all the changes are made to the sets as you want them, click on the **OK** button. You can save the sets and reboot the system now or continue to make other changes.

Create or Modify Packet Filtering

To define new filtering rules or modify an existing one follow these steps:

1. In the first Advanced Filtering and Firewall window, click on the set number you wish to configure to proceed to the Set # window.

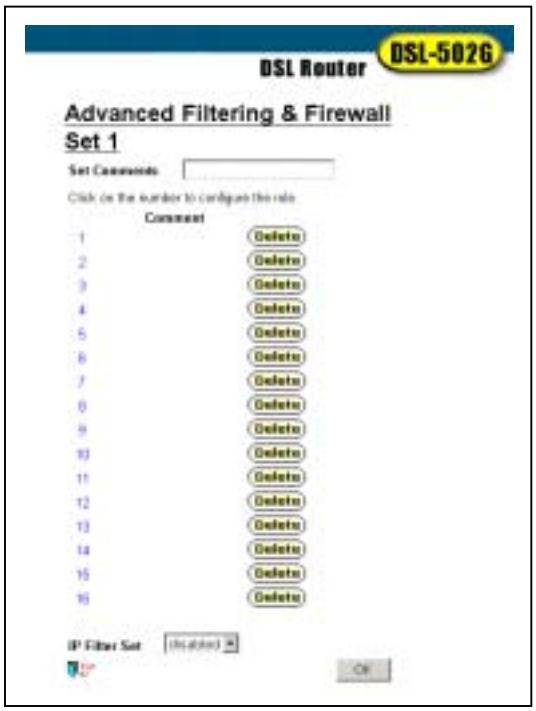


Figure 25. Filtering & Firewall – Set # Menu

In the Set # window, click on the rule number to define or modify that rule. The rule definition menu appears.

Figure 26. Filtering & Firewall - Define Rules Menu

For each rule in a set, you may define the following parameters:

Comment	Type in an appropriate identifying comment for the rule.
Pass or Block	Select *Pass* or *Block* to perform this action on packets as defined below.
Direction	Select *In* or *Out* to pass or block packets coming in or going out of the network.
Protocol	Select *IGMP*, *TCP*, *UDP* or *All* to pass or block packets of that protocol type.
IP Address Filter Rule	
Source	Type in the source IP address and select the Subnet Mask to pass or block packets form that IP address.
Destination	Type in the destination IP address and select the Subnet Mask to pass or block packets destined to that IP address.
Port Filter Rule	UDP and TCP packets only. Select a range of ports to pass or block.
Use the following guide to define the port or port range (Start Port and End Port):	
< : specifies the port numbers less than and equal to the Start Port number	
> : specifies the port numbers greater than and equal to the Start Port number	
= : sets the port number equal to the Start Port if there is no End Port specified; if an End Port number is specified, this defines a range of ports to filter. The range is defined as the port numbers between the Start Port and End Port, including the Start and End Port numbers.	
≠ : the port number does not equal to the Start Port if there is no End Port specified; if an End Port number is specified, this defines a range of ports not to filter. The range is defined as the port numbers between the Start Port and End Port, including the Start and End Port numbers.	
Filter Rule State	Select *enabled* or *disabled* to enable or disable the filter rule as defined in the menu.

When you have defined the rule, click on **OK**, the Save changes and reboot system prompt will appear. You can save and reboot now, or continue to define more filtering rules.

To clear the rules menu to show the default values, click the **Clear** button.

To return to the Set # menu, click the Exit icon. The comment you entered for new rule will appear next to the rule number.

RIP

To enable RIP or specify use of Version 1 or 2 access the RIP menu.

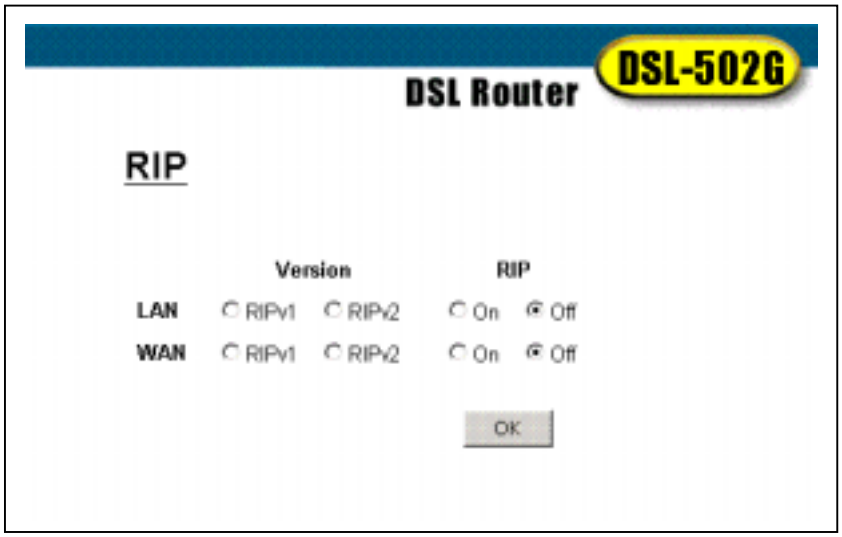


Figure 27. RIP Menu

Select to use RIPv1, RIPv2 or On (both versions) for the LAN and WAN interface. To disable both versions of RIP select Off. Click **OK** to bring up the Save changes and reboot system menu.

Bridge with RFC 1483 Configuration

Menu options for the DSL-502G are different when the connection profile specifies Bridge with RFC 1483 since it is acting in the capacity of a bridge rather than a router. You can see from the figure below that there are fewer menu options for device configuration. Most of the menus in the Configuration file are the same and are used in the same way they are used for Router with PPP configuration. Instructions for using the Connection Profile and Ethernet IP Address menus can be found in the previous section, *Router with PPP Configuration*.

The Layer 2 Filtering menu only appears when the device is in bridge mode.

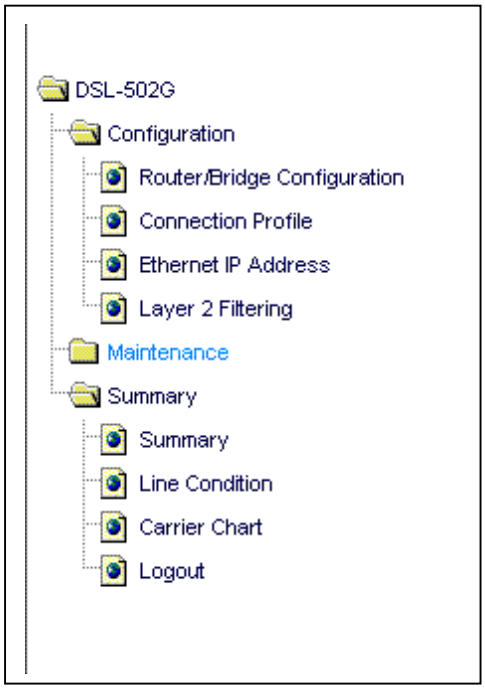


Figure 28. Bridge Configuration Menus

Change Encapsulation - Bridge Configuration

When the device connection profile defines the device as a Bridge with RFC 1483, the first window that appears after login is the Bridge/Router Configuration window. Use this menu to change the encapsulation method used for packets transported through the bridge.

Bridge Configuration

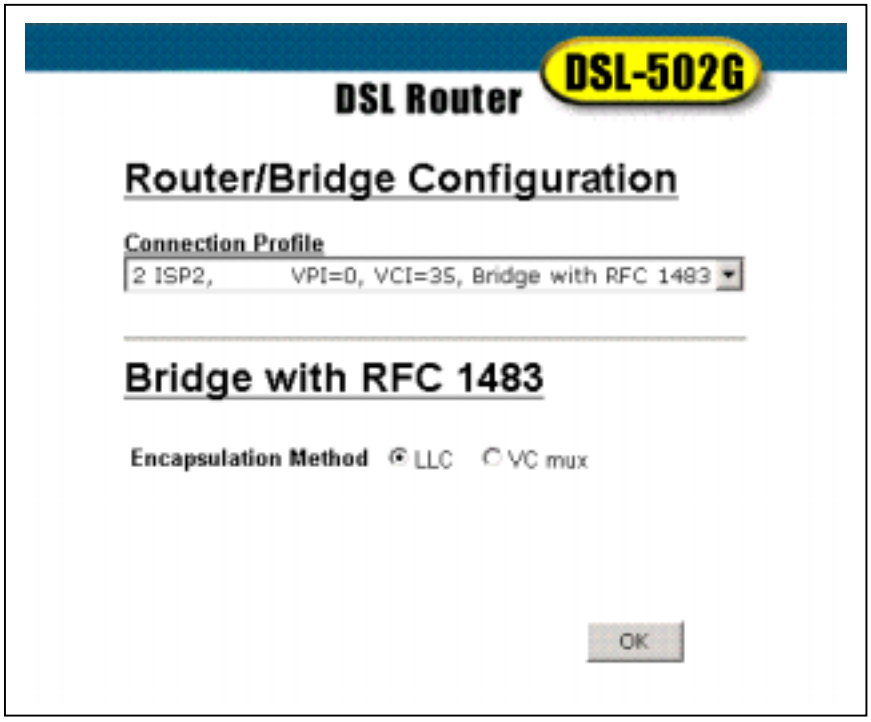


Figure 29. Bridge Configuration Menu

To change the **Encapsulation Method**, click *LLC* or *VC mux* as specified by your service provider and click the **OK** button. You will see the Save changes and reboot system? menu. The default encapsulation setting is LLC.

This menu may also be used change the connection method in the **Connection Profile** drop-down menu.

Layer 2 Filtering (bridge mode only)

The Layer 2 filtering option is available in the bridge configuration folder, it is not an option when the device is configured as a router.

By default, the bridge will pass all packets in either direction. You may specify that certain types of packets be dropped in order to free up bandwidth or improve security. To block a packet type, click in the box so that check mark does not appear in the box and click **OK**. You will see the Save changes and reboot system? menu.

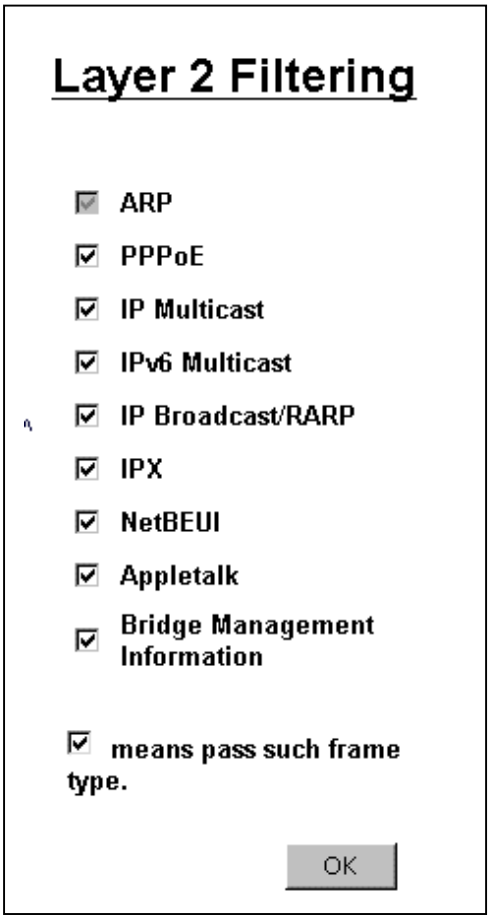


Figure 30. Layer 2 Filter Menu

Maintenance

The Maintenance folder contains the same menus for bridge and router configurations with the exception of the Remote Administration Access option, available only for router configurations.

ATM Loopback Test

ATM loopback tests are used to verify connectivity and path integrity along a specified ATM circuit. In the test, a cell is sent to an endpoint or to the end of the first segment of the ATM path. If the path is available and the connections are functioning, an test cell will be returned along the same ATM path and be detected by the device. This is very similar to a Ping test. The test can help to determine if connectivity problems originate from outside the LAN.

Figure 31. ATM Loopback Screen

To perform the test, define the following parameters:

VPI	Type in the VPI setting used for the network connection.
VCI	Type in the VCI setting used for the network connection.
F4/F5	Choose *F4* (Virtual Path) or *F5* (Virtual Connection) from the pull-down menu to define the flow type. An F4 flow test is used to verify that ATM network information (ATM cells) can be shared between network elements. This information is used within virtual paths to report an unavailable path or a virtual path that cannot be guaranteed. An F5 flow test is also used to verify that ATM network information can be shared between network elements. This information is used within virtual connections to report degraded virtual channel performance such as late arriving cells, lost cells, and cell insertion problems.
etoe/segment	Select the test type from the remaining pull-down menu. Choose *End-to-End* to test the entire path from the Router to the ATM connection endpoint. Choose *segment* to test the path from the Router to the end of the first ATM connection segment.
Status	A success or fail message appears here after the test is completed. If the reply cell is received within the standard-defined time, the Status will read *OK*. This indicates that the specified test path is functioning normally and all connections were successful. If the Status reads *Fail*, there is a fault in the segment or path tested.

When all the test parameters have been specified, click on the **Loop Test** button to initiate the test.

System Username and Password

Use this screen to change the username and password used to access the Web Manager. The Web Manager can be accessed remotely from outside the LAN when it is functioning in router mode using the Remote Administration Access menu (described in a later section).

Figure 32. User Name and Password Menu

1. Type the current **User Name** in the entry field provided.

Type in the current password in the **Old Password** entry field.

Type in the **New Password** in the entry field provided.

Type in the new password again in the **Confirm New Password** field.

Click the **OK** button. The **Save changes and reboot system?** message appears.

Save Changes

In order to save the configuration changes you have just made they must be saved to the Router's non-volatile RAM. In the Maintenance folder, click on the Save Changes button to access the menu below:

DSL Router
DSL-502G
Save Changes
Warning!!
It takes about a minute to save configuration to memory.
Therefore, please DON'T turn off the device's power
until you see the Restart System window.
Save Configuration

Figure 33. Save Changes Menu

Click the **Save Configuration** button. A pop-up message window will inform you that the Router must be restarted. Do not turn off the power to the Router while the settings are being saved.

When the **Restart System** window appears, click the **Restart** button.

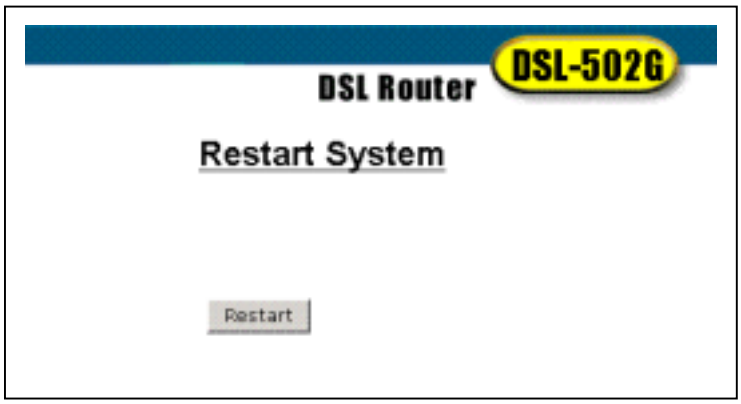


Figure 34. Restart System Window

Factory Reset

The DSL-502G can be reset to the default configuration for all settings using the Factory Reset option. This will also change the both the LAN and WAN IP address of the device, so these will need to be reconfigured accordingly.

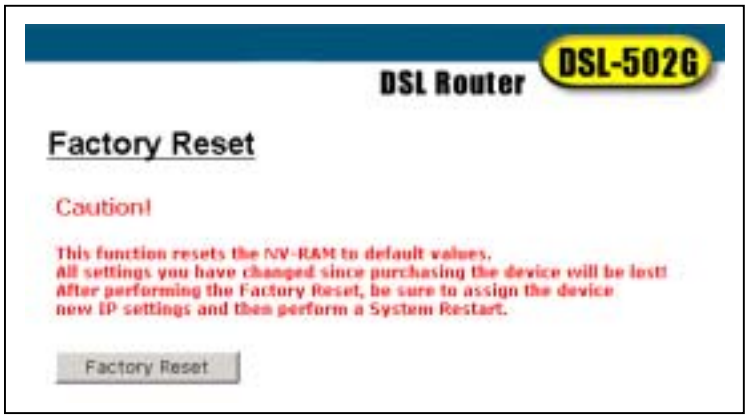

DSL Router
DSL-502G
Factory Reset
Caution!
This function resets the NV-RAM to default values.
All settings you have changed since purchasing the device will be lost!
After performing the Factory Reset, be sure to assign the device
new IP settings and then perform a System Restart.
Factory Reset

Figure 35. Factory Reset Screen

To perform a factory reset, click the **Factory Reset** button. Since the IP settings will return to their default, you will lose access to the Web Manager. To use the Web Manager interface, the LAN IP address will need to be reconfigured.

Update Firmware

Use the Update Firmware feature to load the latest firmware for the device. You can obtain the latest version of the DSL-502G firmware by logging onto the D-Link web site at www.dlink.com. Access the D-Link web site by clicking on the D-Link logo in the upper left corner of the browser window. Save the latest firmware version to a file on the Manager PC or accessible server.

Figure 36. Update Firmware Screen

To upgrade firmware, type in the name and path of the file or click on the **Browse** button to search for the file. Click the **OK** button to begin copying the file. The file will load and restart automatically.

Configuration File Maintenance

Use the Configuration File Maintenance store current settings to a file on the Manager PC or to load previously saved configuration files on the device.

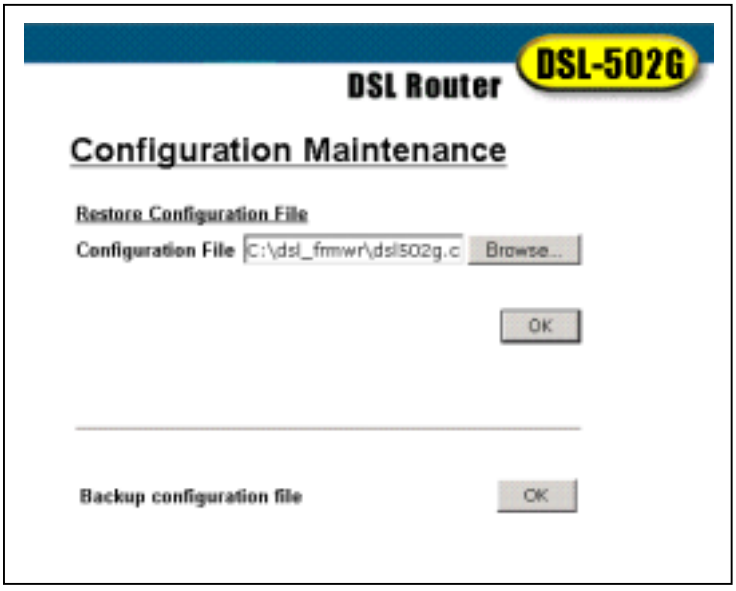


Figure 37. Configuration Maintenance Screen

To save the current settings to a configuration file on the PC, click on the lower **OK** button, after the *Backup configuration file* option. The file will be saved as dslRouter.cfg or you can specify another file name.

To load a saved configuration file form the PC, type in the full name and path in the Configuration File space or click on the **Browse** button to search for the file.

Remote Administration Access (Router mode only)

The Router can be administered using a PC located outside the LAN. Permission to allow remote management must first be allowed by enabled remote management.

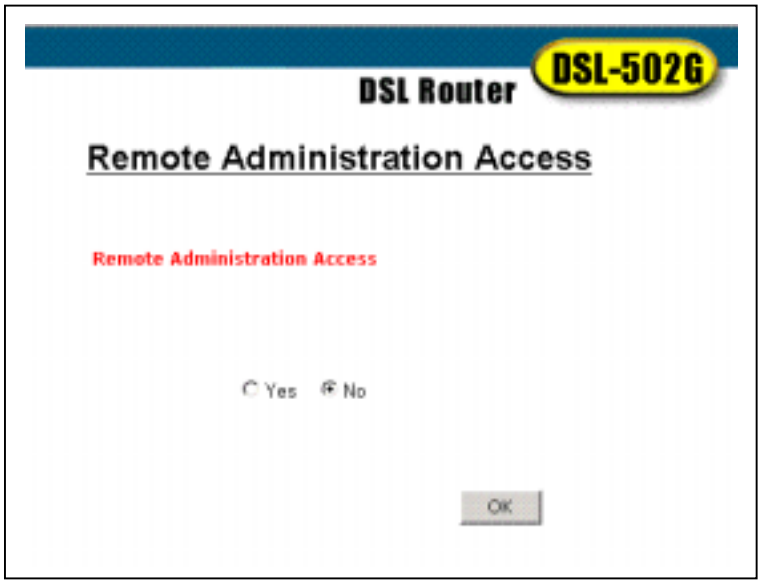


Figure 38. Remote Administration Access

Enable remote access to the web manager by selecting *Yes* and clicking **OK**. The Save changes and reboot? Prompt will appear. Remote Administration is disabled by default.

The contents of the Summary folder differ depending on the mode of operation used by the device. In router mode, the folder offers two additional screens, a DHCP table and a runtime routing table. In addition, the Summary chart contains different information. In router mode, the information presented in the Summary screen is as follows:

Summary	
LAN IP Address Configuration	
IP Address	Router LAN IP Address
Subnet Mask	Subnet Mask on LAN
MAC Address	Fixed Hardware ID of Router
PPP Login Information	
Login User Name	User name used for PPP login
Authentication	Method used for PPP authentication
WAN (PPP) Information	
IP Address	WAN IP address used for account
Connection Status	WAN connection status
PVC Information (ATM Network Backbone)	
VPI	**Virtual Path Identifier**
VCI	**Virtual Circuit Identifier**
Connection Information	
Connection Type	**Connection Protocol**
Encapsulation Method	**Packet encapsulation method**
DHCP Configuration Information	
Start IP Address	Base LAN IP address used
End IP Address	Final LAN IP address available for DHCP
Netmask	Subnet Mask used for LAN
Default Gateway	Gateway device LAN IP address
Leased Time	Device IP address lease time
Primary DNS	DNS server IP address
Domain Name	LAN domain name used (if any)
State	DHCP state (enabled or disabled)
NAT	
NAT Function	NAT function status (enabled or disabled)

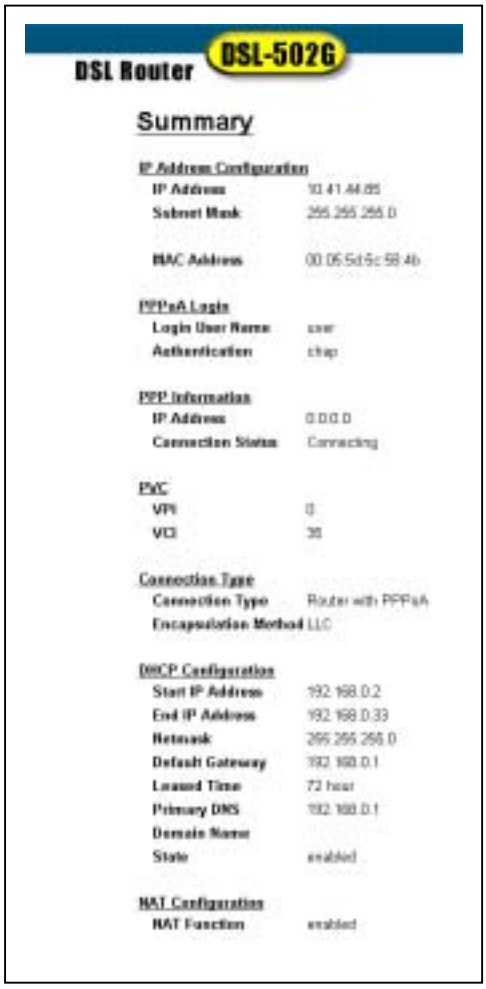


Figure 39. Router Summary Statistics

Bridge Summary

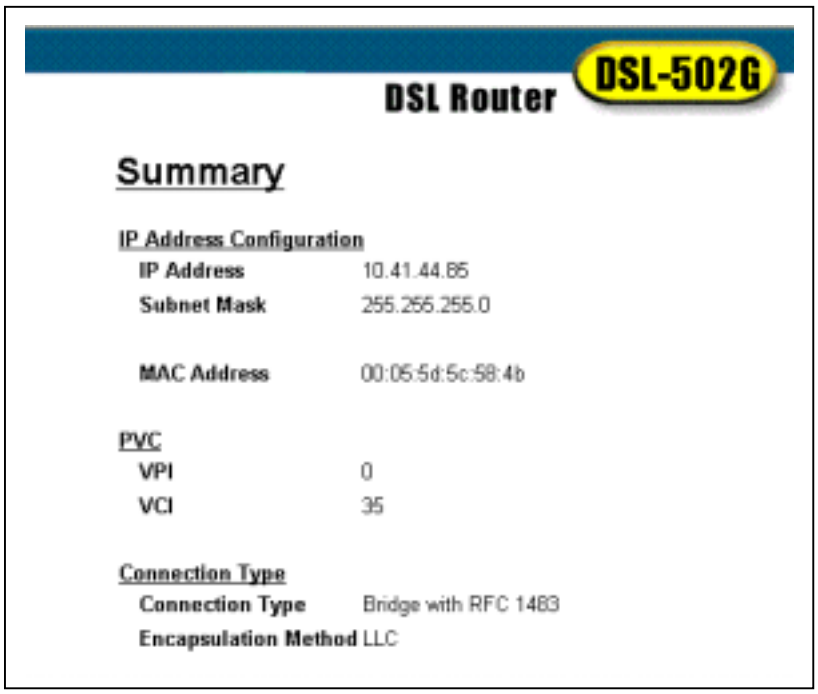


Figure 40. Bridge Summary Screen

In bridge mode, the device does not contain information associated with router functions in the Summary screen.

Line Condition

In the Line Condition window you can monitor the characteristics of the ADSL connection and confirm that it has been established.

Line Condition	
Protocol	
Data Path	Current data path type Fast or Interleaved
Operation Mode	Modulation technique used for ADSL connection, G.DMT or G.lite
Data Transfer Rates	
Downstream	Downstream data transfer rate in Kbps
Upstream	Upstream data transfer rate in Kbps
Signal to Noise Ratio	
SNR	Signal-to-noise ratio in dB
Attenuation	
Downstream	Downstream attenuation of signal in dB
Upstream	Upstream attenuation of signal in dB
Distance	
Loop Distance	Loop in K ft. (range = 0 – 18 K ft.)
Near End *Number of data transfer errors on the near end (ATU-R) listed according to the correction technique*	
FEC	FEC Forward Error Correction
CRC	CRC Cyclic Redundancy Control
HEC	HEC Header Error Check
Far End *Number of data transfer errors on the far end (ATU-R) listed according to the correction technique*	
FEC	FEC Forward Error Correction
CRC	CRC Cyclic Redundancy Control
HEC	HEC Header Error Check
Packet Counter	
Transmit Packets	Number of data packets transmitted
Receive Packets	Number of data packets received

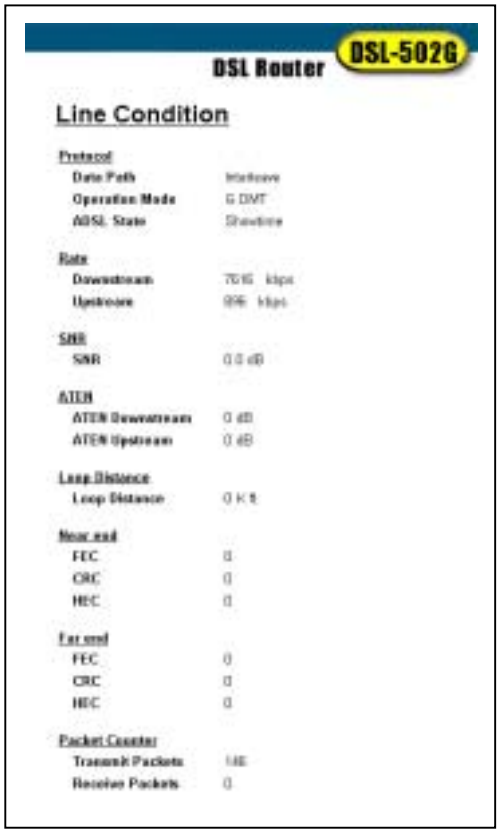
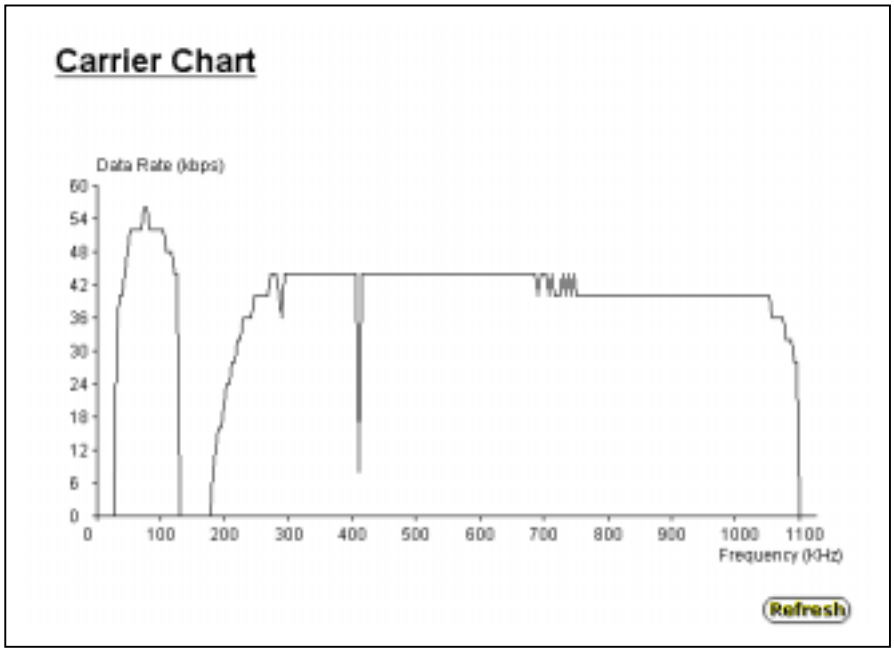


Figure 41. Line Condition

Carrier Chart

The Carrier Chart illustrates the data rates distributed across the upstream and downstream frequency ranges.



Carrier Chart

This chart can be used to gauge signal quality for the entire upstream (lower portion) and downstream (upper portion) range of discrete modular tones. The example above displays normal signal function for the full range of frequencies.

DHCP Allocation Table (Router mode only)

The DHCP Allocation Table provides a summary of current IP setting allocation for the network.

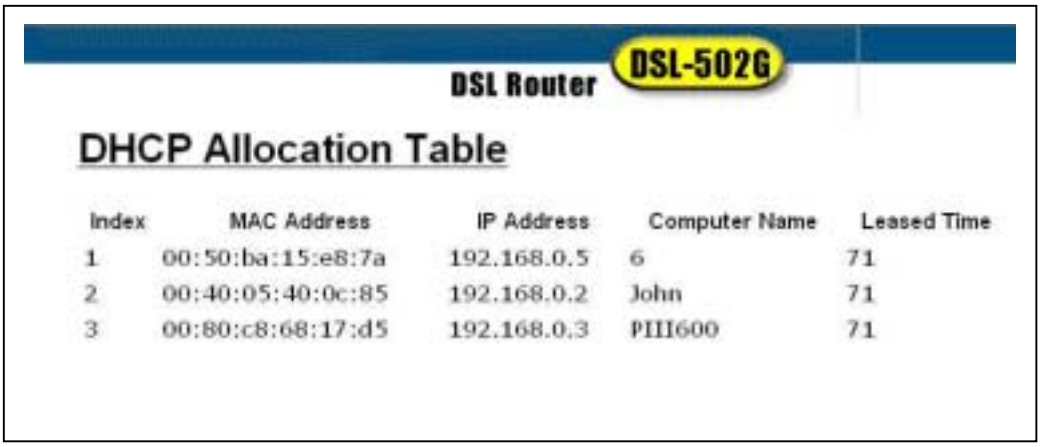


Figure 42. DHCP Allocation Table

Information listed in the DHCP Allocation Table includes the following:

Index	Index reference number for entry.
MAC Address	MAC address of computer or networked device.
IP Address	Assigned IP address of computer or networked device.
Computer Name	Name of computer or networked device.
Leased Time	Leased time of assigned IP address.

Runtime Routing Table (Router mode only)

The Runtime Routing Table provides a summary of dynamic and static routing information for both the LAN and WAN interface.

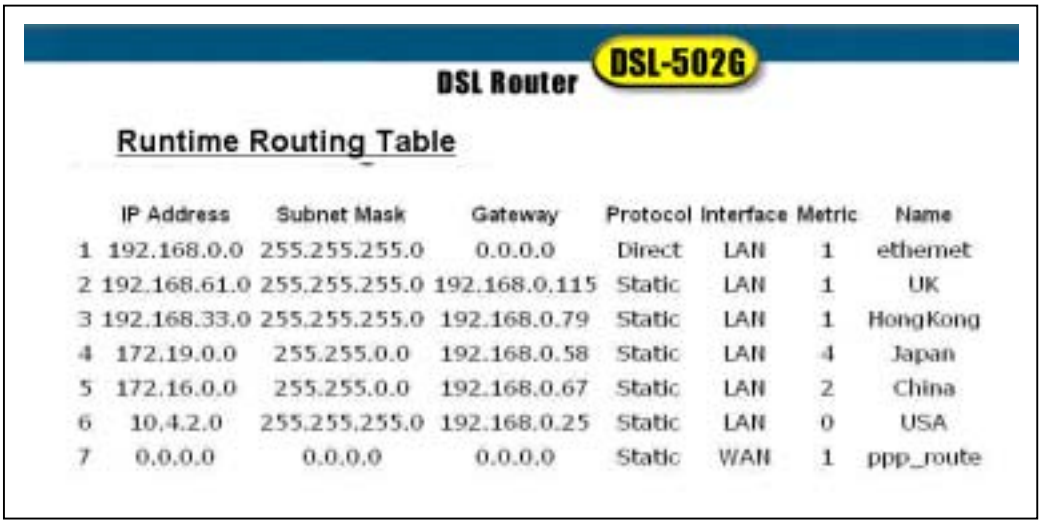

DSL Router
DSL-502G
Runtime Routing Table
IP Address Subnet Mask Gateway Protocol Interface Metric Name
1 192.168.0.0 255.255.255.0 0.0.0.0 Direct LAN 1 ethernet
2 192.168.61.0 255.255.255.0 192.168.0.115 Static LAN 1 UK
3 192.168.33.0 255.255.255.0 192.168.0.79 Static LAN 1 HongKong
4 172.19.0.0 255.255.0.0 192.168.0.58 Static LAN 4 Japan
5 172.16.0.0 255.255.0.0 192.168.0.67 Static LAN 2 China
6 10.4.2.0 255.255.255.0 192.168.0.25 Static LAN 0 USA
7 0.0.0.0 0.0.0.0 0.0.0.0 Static WAN 1 ppp_route

Figure 43. Runtime Routing Table

Information listed in the Runtime Routing Table includes the following:

IP Address	IP address of network, subnet or device used for route
Subnet Mask	Subnet mask used for route
Gateway	IP address of gateway device used for route
Protocol	Route protocol or type, Direct or Static
Interface	Interface of network, subnet or device used for router, LAN or WAN
Metric	Number of hops used/allowed for route
Name	Name assigned to route

A

Technical Specifications

GENERAL		
STANDARDS:	ITU G.992.1 (G.dmt) ITU G.992.2 (G.lite) ITU G.994.1 (G.Hs) ITU-T Rec. I.361 ITU-T Rec. I.610 IEEE 802.3 IEEE 802.3u IEEE 802.1d RFC 791 (IP Routing) RFC 792 (UDP) RFC 826 (ARP) RFC 1058 (RIP 1) RFC 1389 (RIP 2) RFC 1213 compliant RFC 1483 (Bridged Ethernet) RFC 1577 (IP over ATM)	RFC 1661 (PPP) RFC 1994 (CHAP) RFC 1334 (PAP) RFC 2364 (PPP over ATM) RFC 1631 (NAT) RFC 1877 (Automatic IP assignment) RFC 2516 (PPP over Ethernet) Supports RFC 2131 and RFC 2132 (DHCP) Compatible with all T1.413 issue 2 (full rate DMT over analog POTS), and CO DSLAM equipment Supports ATM Forum UNI V3.1 PVC
PROTOCOLS:	TCP/IP UDP RIP-1 RIP-2 IGMP	DHCP BOOTP ARP AAL5
DATA TRANSFER RATE:	G.dmt full rate: Downstream up to 8 Mbps Upstream up to 640 Kbps G.lite: Downstream up to 1.5 Mbps Upstream up to 512 Kbps	
MEDIA INTERFACE EXCHANGE:	RJ-11 port ADSL telephone line connection RJ-45 port for 10BASET Ethernet connection	

Physical and Environmental	
DC inputs: Power Adapter:	Input: 120V AC, 1.0A, 60Hz Output: 9V AC, 1A
Power Consumption:	10 Watts (Max)
Operating Temperature:	0° to 50° C (32° - 122° F)
Humidity:	5 to 95% (non-condensing)
Dimensions:	137 mm x 183 mm x 31 mm
Weight:	455gm (1 lb.)
EMI:	FCC Class B, CE Class B
Safety:	CSA International

B

LAN IP Setup

The DSL-502G is designed to provide network administrators maximum flexibility for IP addressing on the Ethernet LAN. The easiest IP setup choice in most cases is to let the Router do it using DHCP, which is enabled by default. This appendix briefly describes various options including DHCP, used for IP setup on a LAN. If you are new to IP networking, the next appendix provides some background information on basic IP concepts.

Assigning Network IP Addresses

The IP address settings, which include the IP address, subnet mask and gateway IP address are the first and most important internal network settings that need to be configured. The Router is assigned a default LAN IP address and subnet mask. If you do not have a preexisting IP network and are setting one up now, using the factory default IP address settings can greatly ease the setup process. If you already have a preexisting IP network, you can adjust the IP settings for the Router to fit within your existing scheme.

Using the Default IP Address

The Router is shipped with a preset default IP address setting of 192.168.0.1 for the LAN port. There are two ways to use this default IP address, you can manually assign an IP address and subnet mask for each PC on the LAN or you can instruct the Router to automatically assign them using DHCP. The simplest method is to use DHCP. The DHCP function is active by default.

Manual IP Address Assignment

Manually configuring IP settings for the LAN means you must manually set an IP address, subnet mask and IP address of the default gateway (the Router's IP address) on each networked computer. The example listed below describes IP configuration for computers running Windows 98 or Windows 95. Regardless of what operating system is used on each workstation, the three network IP settings must be defined so the network interface used by each workstation can be identified by the Router, and vice versa. For detailed information about configuring your workstations IP settings, consult the user's guide included with the operating system or the network interface card (NIC).

1. In Windows 95/98, click on the **START** button, go to **Settings** and choose **Control Panel**.
2. In the window that opens, double-click on the **Network** icon.
3. Under the Configuration tab, select the **TCP/IP** component and click *Properties*.
4. Choose the *Specify an IP address* option and edit the address settings accordingly. Consult the table below for IP settings on a Class C network.

Using Default IP without DHCP			
Host	**IP Address**	**Subnet Mask**	**Gateway IP**
Router	192.168.0.1	255.255.255.0	
Computer #1	192.168.0.2	255.255.255.0	192.168.0.1
Computer #2	192.168.0.3	255.255.255.0	192.168.0.1
Computer #3	192.168.0.4	255.255.255.0	192.168.0.1

LAN IP Setup - Example #1

Please note that when using the default IP address as in the above example, the first three numbers in the IP address must always be the same with only the fourth number changing. The first three numbers define the network IP address (all machines must belong to the same IP network), while the last number denotes the host IP address (each computer must have a unique address to distinguish it on the network). The IP address scheme used in Example #1 can be used for any LAN that requires up to 253 separate IP addresses (excluding the Router). Notice that the subnet mask is the same for all machines and the default gateway address is the LAN IP address of the Router.

It is a good idea to make a note of each device's IP address for reference during troubleshooting or when adding new stations or devices.

Using DHCP

The second way to use the default settings is to allow the Router to automatically assign IP settings for workstation using DHCP. To do this, simply make sure your computers' IP addresses are set to 0.0.0.0 (under Windows, choose the option Obtain an IP address automatically in the TCP/IP network component described above). When the computers are restarted, their IP settings will automatically be assigned by the Router. The Router is set by default to use DHCP. See the discussion in Chapter 5 for information on how to use configure the Router for DHCP.

Changing the IP Address of the Router

When planning your LAN IP address setup, you may use any scheme allowed by rules that govern IP assignment. It may be more convenient or easier to remember an IP scheme that use a different address for the Router. Or you may be installing the Router on a network that has already established the IP settings. Changing the IP address is a simple matter and can be done using the web manager (see *LAN IP Address* in Chapter 5). If you are incorporating the Router into a LAN with an existing IP structure, be sure to disable the DHCP function. Also, consider the effects of the NAT function which is enable by default.

An IP addressing scheme commonly used for Ethernet LANs establishes 10.0.0.1 as the base address for the network. Using Example #2 below, the Router is assigned the base address 10.0.0.1 and the remaining addresses are assigned manually or using DHCP.

Alternative IP Assignment			
Host	**IP Address**	**Subnet Mask**	**Gateway IP**
Router	10.0.0.1	255.255.255.0	
Computer #1	10.0.0.2	255.255.255.0	192.168.0.1
Computer #2	10.0.0.3	255.255.255.0	192.168.0.1
Computer #3	10.0.0.4	255.255.255.0	192.168.0.1

LAN IP Setup - Example #2

These two examples are only examples you can use to help you get started. If you are interested in more advanced information on how to use IP addressing on a LAN there are numerous resources freely available on the Internet. There are also many books and chapters of books on the subject of IP address assignment, IP networking and the TCP/IP protocol suite.

C

IP Concepts

This appendix describes some basic IP concepts, the TCP/IP addressing scheme and show how to assign IP Addresses.

When setting up the Router, you must make sure it has a valid IP address. Even if you will not use the WAN port (ADSL port), you should, at the very least, make sure the Ethernet LAN port is assigned a valid IP address. This is required for telnet, in-band SNMP management, and related functions such as "trap" handling and TFTP firmware download.

IP Addresses

The Internet Protocol (IP) was designed for routing data between network sites all over the world, and was later adapted for routing data between networks within any site (often referred to as "subnetworks" or "subnets"). IP includes a system by which a unique number can be assigned to each of the millions of networks and each of the computers on those networks. Such a number is called an IP address.

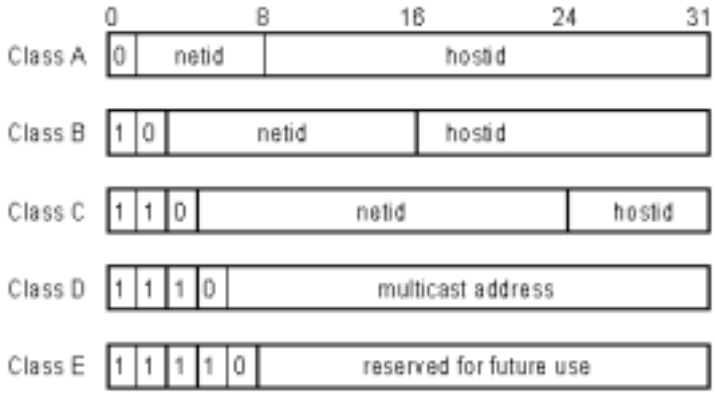
To make IP addresses easy to understand, the originators of IP adopted a system of representation called "dotted decimal" or "dotted quad" notation. Below are examples of IP addresses written in this format:

201.202.203.204 189.21.241.56 125.87.0.1

Each of the four values in an IP address is the ordinary decimal (base 10) representation of a value that a computer can handle using eight "bits" (binary digits — 1s and 0s). The dots are simply convenient visual separators.

Zeros are often used as placeholders in dotted decimal notation; 189.21.241.56 can therefore also appear as 189.021.241.056.

IP networks are divided into three classes on the basis of size. A full IP address contains a network portion and a "host" (device) portion. The network and host portions of the address are different lengths for different classes of networks, as shown in the table below.



Networks attached to the Internet are assigned class types that determine the maximum number of possible hosts per network. The previous figure illustrates how the net and host portions of the IP address differ among the three classes. Class A is assigned to networks that have more than 65,535 hosts; Class B is for networks that have 256 to 65534 hosts; Class C is for networks with less than 256 hosts.

IP Network Classes			
Class	**Maximum Number of Networks in Class**	**Network Addresses (Host Portion in Parenthesis)**	**Maximum Number of Hosts per Network**
A	126	1(.0.0.0) to 126(.0.0.0)	16,777,214
B	16,382	128.1(.0.0) to 191.254(.0.0)	65,534
C	2,097,150	192.0.1(.0) to 223.255.254(.0)	254

Note: All network addresses outside of these ranges (Class D and E) are either reserved or set aside for experimental networks or multicasting.

When an IP address's host portion contains only zero(s), the address identifies a network and not a host. No physical device may be given such an address.

The network portion must start with a value from 1 to 126 or from 128 to 223. Any other value(s) in the network portion may be from 0 to 255, except that in class B the network addresses 128.0.0.0 and 191.255.0.0 are reserved, and in class C the network addresses 192.0.0.0 and 223.255.255.0 are reserved.

The value(s) in the host portion of a physical device's IP address can be in the range of 0 through 255 as long as this portion is not all-0 or all-255. Values outside the range of 0 to 255 can never appear in an IP address (0 to 255 is the full range of integer values that can be expressed with eight bits).

The network portion must be the same for all the IP devices on a discrete physical network (a single Ethernet LAN, for example, or a WAN link). The host portion must be different for each IP device — or, to be more precise, each IP-capable port or interface — connected directly to that network.

The network portion of an IP address will be referred to in this manual as a **network number**; the host portion will be referred to as a **host number**.

To connect to the Internet or to any private IP network that uses an Internet-assigned network number, you must obtain a registered IP network number from an Internet-authorized network information center. In many countries you must apply through a government agency, however they can usually be obtained from your Internet Service Provider (ISP).

If your organization's networks are, and will always remain, a closed system with no connection to the Internet or to any other IP network, you can choose your own network numbers as long as they conform to the above rules.

If your networks are isolated from the Internet, e.g. only between your two branch offices, you can assign any IP Addresses to hosts without problems. However, the Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of IP Addresses specifically for private (stub) networks:

Class	Beginning Address	Ending Address
A	10.0.0.0	10.255.255.255
B	172.16.0.0	172.31.255.255
C	192.168.0.0	192.168.255.255

It is recommended that you choose private network IP Addresses from the above list. For more information on address assignment, refer to RFC 1597, *Address Allocation for Private Internets* and RFC 1466, *Guidelines for Management of IP Address Space*.

Subnet Mask

In the absence of subnetworks, standard TCP/IP addressing may be used by specifying subnet masks as shown below.

IP Class	Subnet Mask
Class A	255.0.0.0
Class B	255.255.0.0
Class C	255.255.255.0

Subnet mask settings other than those listed above add significance to the interpretation of bits in the IP address. The bits of the subnet mask correspond directly to the bits of the IP address. Any bit an a subnet mask that is to correspond to a net ID bit in the IP address must be set to 1.

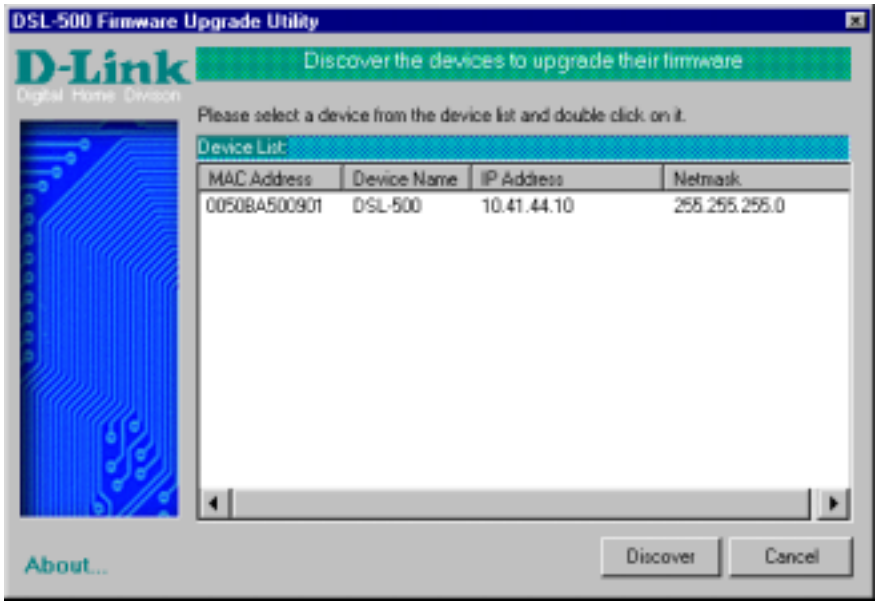
D

DSL-502G Firmware Upgrade Utility

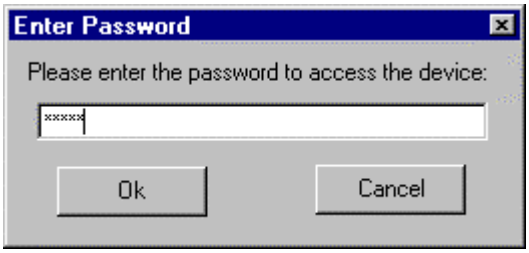
You can update system firmware using the DSL-502G Firmware Upgrade Utility. To upgrade the Router's firmware, first install the Upgrade Utility software on a computer running a Windows operating system. Install the utility by clicking the file titled **setup.exe** located on the Installation CD-ROM. It will be installed automatically. It is recommended that the PC be directly connected to the Router using a crossed cable, however you may upgrade it through the LAN from a remote host.

You also need to download the latest firmware version file from the D-Link web site to the PC on which you will use the Upgrade Utility. Instructions for downloading the firmware are located on the web site at www.dlink.com.

To launch the DSL-502G Firmware Upgrade Utility, click on the icon. Allow a few moments for the software to discover the Router on the network. After the discovery phase the following window will appear. You will see all the DSL-502G Routers on your network. You can identify individual devices by either its IP address or its MAC address. Select the device you wish to upgrade by double clicking on it.

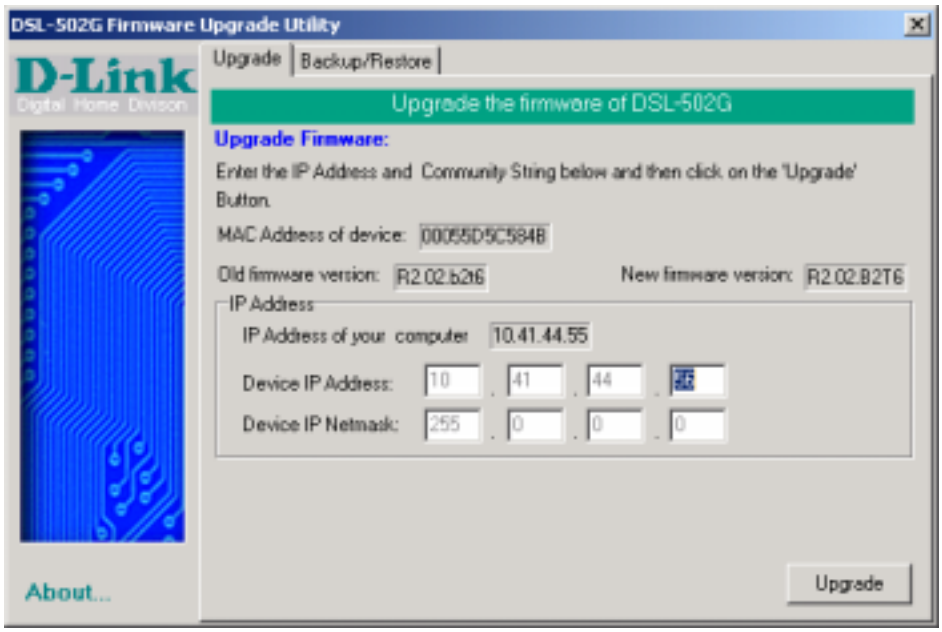


When you select a Router to upgrade you will be prompted for a password. The default password is **admin**. If you want to change the password, you can change it using the console manager interface as described in Chapter 6.



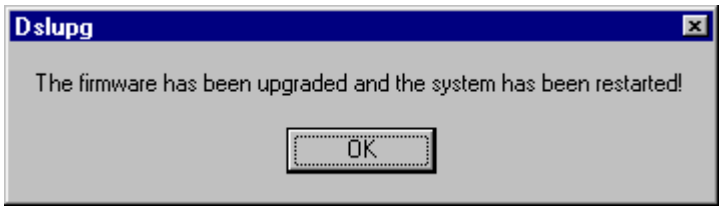
Enter the password and click OK.

In the new window you will see the MAC address of the Router and the IP address of the PC you are using. The PC and the Router must be on the same subnet for the upgrade to be completed. The upgrade utility will suggest a new IP address to be temporarily assigned to the device during the firmware upgrade procedure. Check the suggested IP address listed for the Router to be sure that it does not conflict with any existing IP addresses on your network. To change the temporary IP address of the Router, type in an available IP address in the space provided. You should change only the host portion of the address.


DSL-502G Firmware Upgrade Utility
D-Link
Digital Home Division
Upgrade
Backup/Restore
Upgrade the firmware of DSL-502G
Upgrade Firmware:
Enter the IP Address and Community String below and then click on the 'Upgrade' Button.
MAC Address of device: 00055D5C584B
Old firmware version: R2.02.b26
New firmware version: R2.02.B2T6
IP Address
IP Address of your computer: 10.41.44.55
Device IP Address: 10 . 41 . 44 . 28
Device IP Netmask: 255 . 0 . 0 . 0
About...
Upgrade

To upload the new firmware to the selected Router click the 'Upgrade' button. The utility will automatically load the new firmware. During the upgrade process it is important that you allow the entire file to load onto the device. Do not turn off the Router while the flash memory is being updated. A warning will appear during the upgrade reminding you not to power off the device.

When the new firmware has been successfully loaded a new window will inform you of the upgrade and tell you that the Router has been restarted. Click OK to proceed.



E

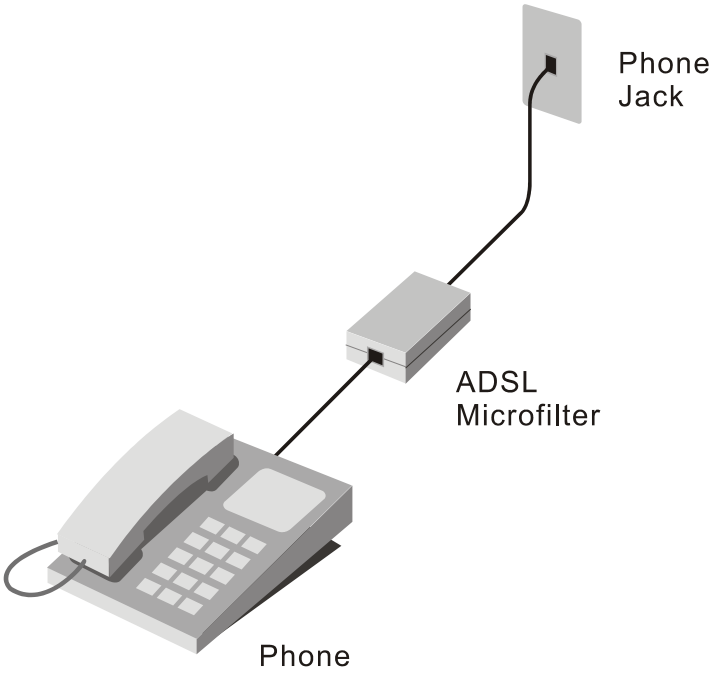
Microfilters and Splitters

Most ADSL clients will be required to install a simple device that prevents the ADSL line from interfering with regular telephone services. These devices are commonly referred to as microfilters or sometimes called (inaccurately) line splitters. They are easy to install and use standard telephone connectors and cable.

Some ADSL service providers will send a telecommunications technician to modify the telephone line, usually at the point where the telephone line enters the building. If a technician has divided or split your telephone line into two separate lines - one for regular telephone service and the other for ADSL – then you do not need to use any type of filter device. Follow the instructions given to you by your ADSL service provider about where and how you should connect the Modem to the ADSL line.

Microfilters

Unless you are instructed to use a "line splitter" (see below), it will be necessary to install a microfilter (low pass filter) device for each telephone or telephone device (answering machines, Faxes etc.) that share the line with the ADSL service. Microfilters are easy-to-install, in-line devices, which attach to the telephone cable between the telephone and wall jack. Microfilters that install behind the wall plate are also available. A typical in-line microfilter installation is shown in the diagram below.



Microfilter Installation

Note: Do not install the microfilter between the Modem and the telephone jack. Microfilters are only intended for use with regular telephones, Fax machines and other regular telephone devices.

Line Splitter

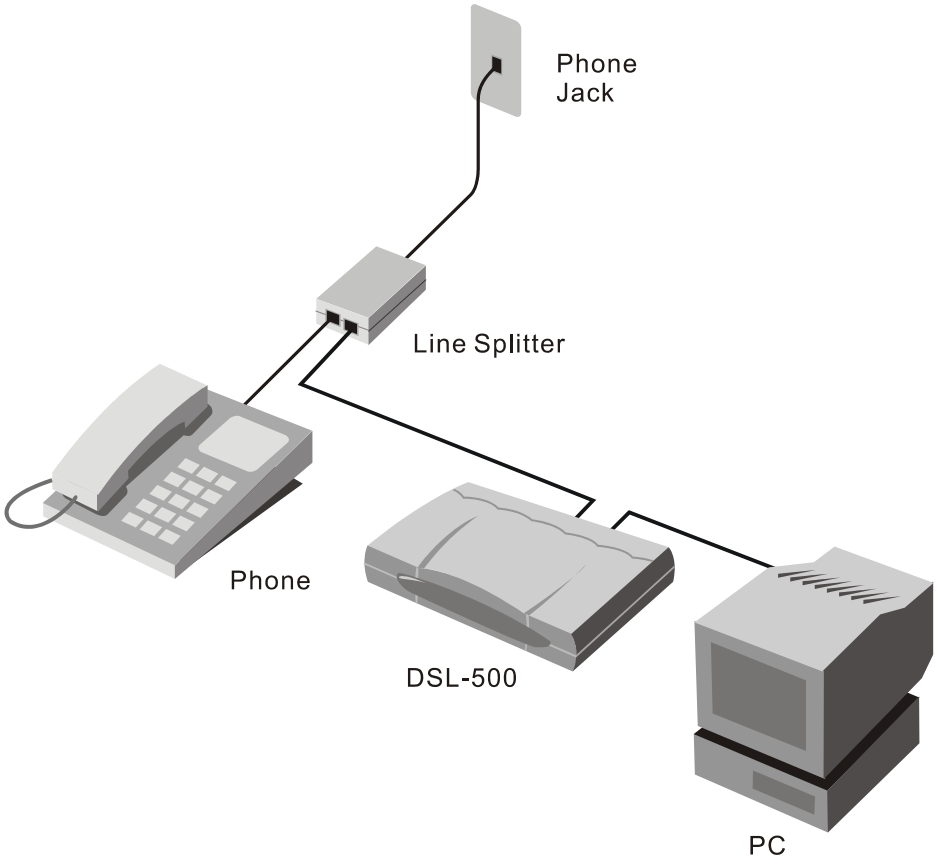
If you are instructed to use a "line splitter", you must install the device between the Modem and the phone jack. Use standard telephone cable with standard RJ-11 connectors. The splitter has three RJ-11 ports used to connect to the wall jack, the Modem and if desired, a telephone or telephone device. The connection ports are typically labeled as follows:

Line - This port connects to the wall jack.

ADSL – This port connects to the Modem.

Phone – This port connects to a telephone or other telephone device.

The diagram below illustrates the proper use of the splitter.



Line Splitter Installation

D-Link® 1-Year Limited Warranty

D-Link Systems, Inc. ("D-Link") provides this limited warranty for its product only to the person or entity who originally purchased the product from D-Link or its authorized reseller or distributor.

Limited Hardware Warranty: D-Link warrants that the hardware portion of the D-Link products described below ("Hardware") will be free from material defects in workmanship and materials from the date of original retail purchase of the Hardware, for the period set forth below applicable to the product type ("Warranty Period") if the Hardware is used and serviced in accordance with applicable documentation; provided that a completed Registration Card is returned to an Authorized D-Link Service Office within ninety (90) days after the date of original retail purchase of the Hardware. If a completed Registration Card is not received by an authorized D-Link Service Office within such ninety (90) day period, then the Warranty Period shall be ninety (90) days from the date of purchase.

Product Type	**Warranty Period**
Product (including any power supplies and fans), if purchased and delivered in the fifty (50) United States, or the District of Columbia ("USA")	1-Year Limited Warranty
Spare parts and spare kits	Ninety (90) days

D-Link's sole obligation shall be to repair or replace the defective Hardware at no charge to the original owner. Such repair or replacement will be rendered by D-Link at an Authorized D-Link Service Office. The replacement Hardware need not be new or of an identical make, model or part; D-Link may in its discretion may replace the defective Hardware (or any part thereof) with any reconditioned product that D-Link reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. The Warranty Period shall extend for an additional ninety (90) days after any repaired or replaced Hardware is delivered. If a material defect is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to repair or replace the defective Hardware, the price paid by the original purchaser for the defective Hardware will be refunded by D-Link upon return to D-Link of the defective Hardware. All Hardware (or part thereof) that is replaced by D-Link, or for which the purchase price is refunded, shall become the property of D-Link upon replacement or refund.

Limited Software Warranty: D-Link warrants that the software portion of the product ("Software") will substantially conform to D-Link's then current functional specifications for the Software, as set forth in the applicable documentation, from the date of original delivery of the Software for a period of ninety (90) days ("Warranty Period"), if the Software is properly installed on approved hardware and operated as contemplated in its documentation. D-Link further warrants that, during the Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. D-Link's sole obligation shall be to replace the non-conforming Software (or defective media) with software that substantially conforms to D-Link's functional specifications for the Software. Except as otherwise agreed by D-Link in writing, the replacement Software is provided only to the original licensee, and is subject to the terms and conditions of the license granted by D-Link for the Software. The Warranty Period shall extend for an additional ninety (90) days after any replacement Software is delivered. If a material non-conformance is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to replace the non-conforming Software, the price paid by the original licensee for the non-conforming Software will be refunded by D-Link; provided that the non-conforming Software (and all copies thereof) is first returned to D-Link. The license granted respecting any Software for which a refund is given automatically terminates.

What You Must Do For Warranty Service:

Registration Card. The Registration Card provided at the back of this manual must be completed and returned to an Authorized D-Link Service Office for each D-Link product within ninety (90) days after the product is purchased and/or licensed. The addresses/telephone/fax list of the nearest Authorized D-Link Service Office is provided in the back of this manual. FAILURE TO PROPERLY COMPLETE AND TIMELY RETURN THE REGISTRATION CARD MAY AFFECT THE WARRANTY FOR THIS PRODUCT.

Submitting A Claim. Any claim under this limited warranty must be submitted in writing before the end of the Warranty Period to an Authorized D-Link Service Office. The claim must include a written description of the Hardware defect or Software nonconformance in sufficient detail to allow D-Link to confirm the same. The original product owner must obtain a Return Material Authorization (RMA) number from the Authorized D-Link Service Office and, if requested, provide written proof of purchase of the product (such as a copy of the dated purchase invoice for the product) before the warranty service is provided. After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. The packaged product shall be insured and shipped to D-Link, 53 Discovery Drive, Irvine CA 92618, with all shipping costs prepaid. D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link's reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming.

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CE Mark Warning: This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures

FCC Warning: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

To Register Your D-Link Product, register online at http://www.dlink.com/sales/reg